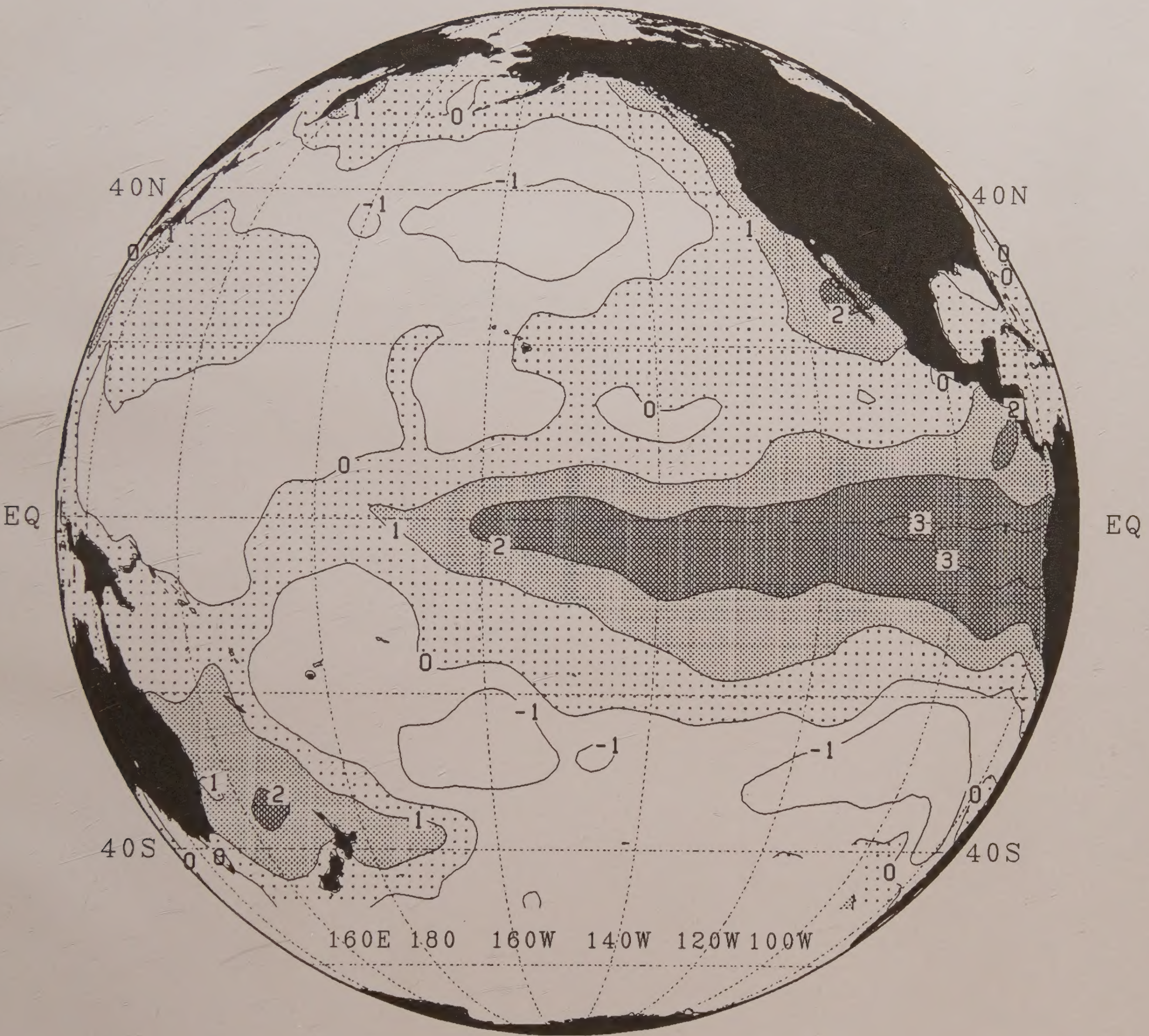
気象庁海洋月報

Monthly Ocean Report

February 1998 (No. 62)



Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

平成１０年２月

気象庁海洋月報は、気象庁 気候·海洋気象部 海洋課で作成しています。

本月報に関する問い合わせは、

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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、1998年2月の太平洋の月平均海面水温偏差図です。

陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for February 1998 in the Pacific Ocean.

Areas of positive anomalies are shaded.

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海況の特徴（１９９８年２月）

日本近海の海況

海面水温は，本州の南から南西諸島の東にかけて平年より１℃以上高く，北海道南東方及び本州東方で平年より１℃以上低かった（第4図）。

黒潮は，九州から紀伊半島にかけて接岸した後，上旬は，八丈島付近を通って140°E線に沿って北上し，中旬～下旬には，三宅島の南を経て，房総半島沖を東に流れていた（第9図）。

親潮系の冷水の沿岸寄りの分枝は38.5°N，142.0°Eまで達していた（第5図）。

太平洋の海況

太平洋赤道域の海面水温は，170゜W以東で平年より１℃以上高い状態が続き，115゜W以東では，＋3℃を越える正偏差が見られた。エルニーニョ監視海域（4°N～4°S，150°W～90°W）の海面水温偏差は＋2.6℃で，11月から減少しているが，季節的には昇温期にあることから，海面水温は上昇し28.8℃に達した（表1）。

北太平洋では，40°N付近の負偏差は先月より強まり，170°W～150°Wでは，-1.5℃を越える負偏差となっていた。15°N以北の北米沿岸は，先月に引き続き+1℃を越える正偏差で覆われていた（第16図）。

Highlights February 1998

Seas adjacent to Japan

Positive SST anomalies exceeded +1°C from south of Honshu to east of the Nansei Islands. SSTs were more than -1°C below normal southeast of Hokkaido and east of Honshu (Fig. 4).

The Kuroshio flowed along the coasts from Kyushu to Kii Peninsula. During the first 10-day of February, after passing Hachijyo Island, it flowed northward along 140°E, then eastward off Boso Peninsula. During the rest of the month, it flowed south of Miyake Island and then eastward off Boso Peninsula (Fig. 9).

Coastal branch of the Oyashio cold water extended southward to 38.5°N, 142.0°E (Fig. 5).

Pacific Ocean

In the equatorial Pacific, positive SST anomalies exceeded +1°C east of 170°W and +3°C from 115°W eastward. The SST anomaly of El Niño monitoring region (4°N-4°S, 150°W-90°W) was +2.6°C. Though the anomaly has reduced since November 1997, the value of SST has increased to 28.8°C because it is a period of climatologically warming there (Table 1).

In the North Pacific, negative SST anomalies along 40°N were intensified to be exceeding -1.5°C between 170°W and 150°W. Positive SST anomalies exceeding +1°C still prevailed along the North American coast north of 15°N (Fig. 16).

137°Eにおける表層水温変動

Subsurface water temperature variation along the 137°E meridian

気象庁は観測船「凌風丸」及び「啓風丸」によって，北西太平洋の 137°E に沿った海洋観測を年 4 回行っている (図 A)。この観測線の熱帯域ではエルニーニョ現象の状況によって表層の暖水の厚さが変化している。28°C 以上の暖水は今回のエルニーニョ現象が発生する以前の 1996 年 7 月には 50 ～ 100 m, 1997 年 1 ～ 2 月には 8°N 以南で 30 ～ 40 m の厚さであったが，1997 年春のエルニーニョ現象 (図 B) 発生の後，1997 年 6 月には 30 ～ 60 m となり，1998 年 2 月には全く観測されなかった (図 C)。

The Japan Meteorological Agency has been performing oceanographic observations along the 137°E meridian in the western North Pacific every season (Fig. A). The thickness of the warm water exceeding 28°C in the tropical region along the 137°E meridian varies in association with the ENSO condition. Before the current warm episode, the thickness of warm water was 50–100 m in July 1996 and 30–40 m south of 8°N in January/February 1997. After the onset of the warm episode in the spring of 1997, the thickness of warm water was 30–60 m in June 1997. In February 1998, there were no waters warmer than 28°C (Fig. C).

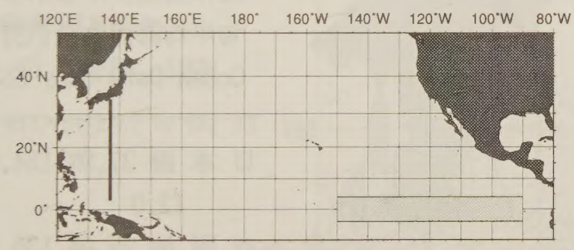


図 A. 137°E に沿った海洋観測線 (太線) とエルニーニョ監視海域 (陰影部) の位置.

Fig. A. Oceanographic observation line along 137°E meridian (thick line) and the El Niño monitoring region (shaded).

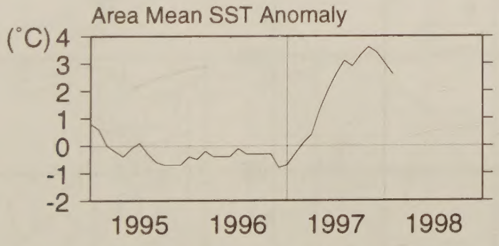


図 B. エルニーニョ監視海域における海面水温偏差.

Fig. B. Time series of SST anomalies in the El Niño monitoring region.

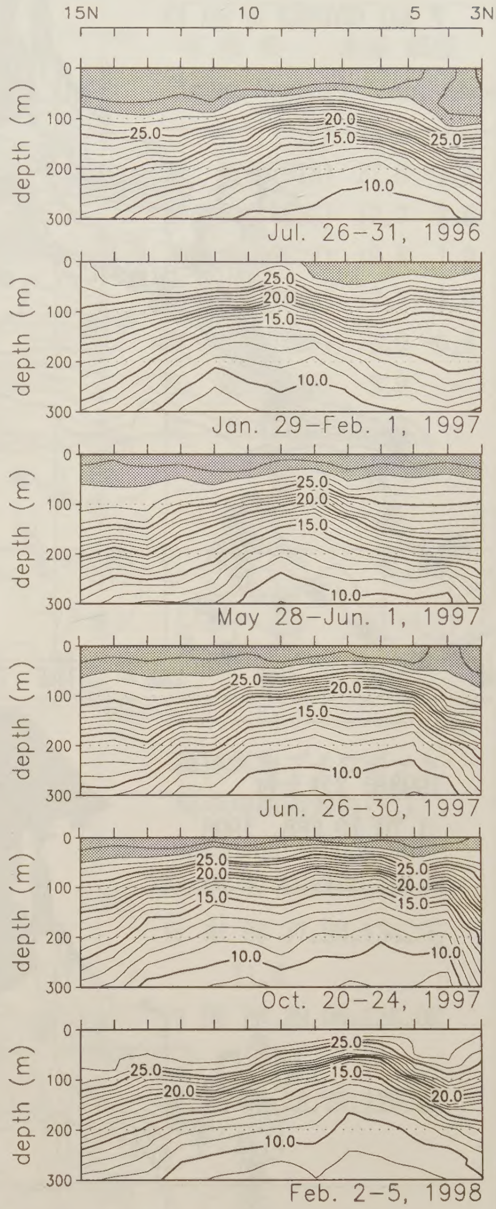
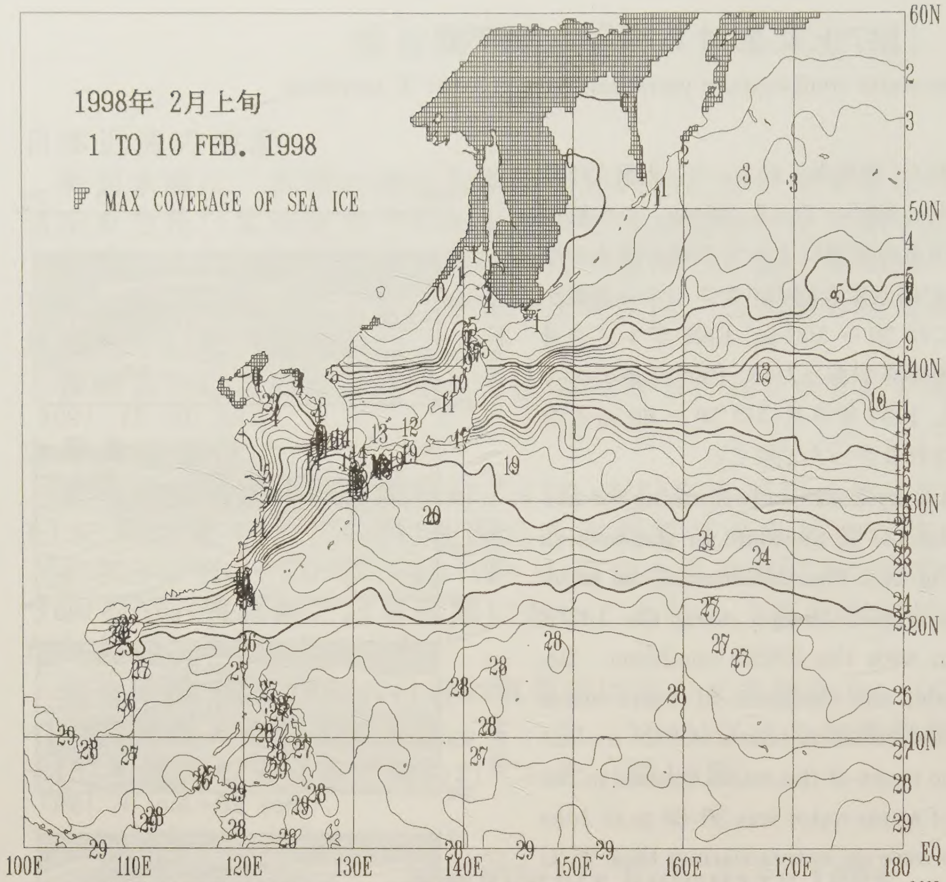


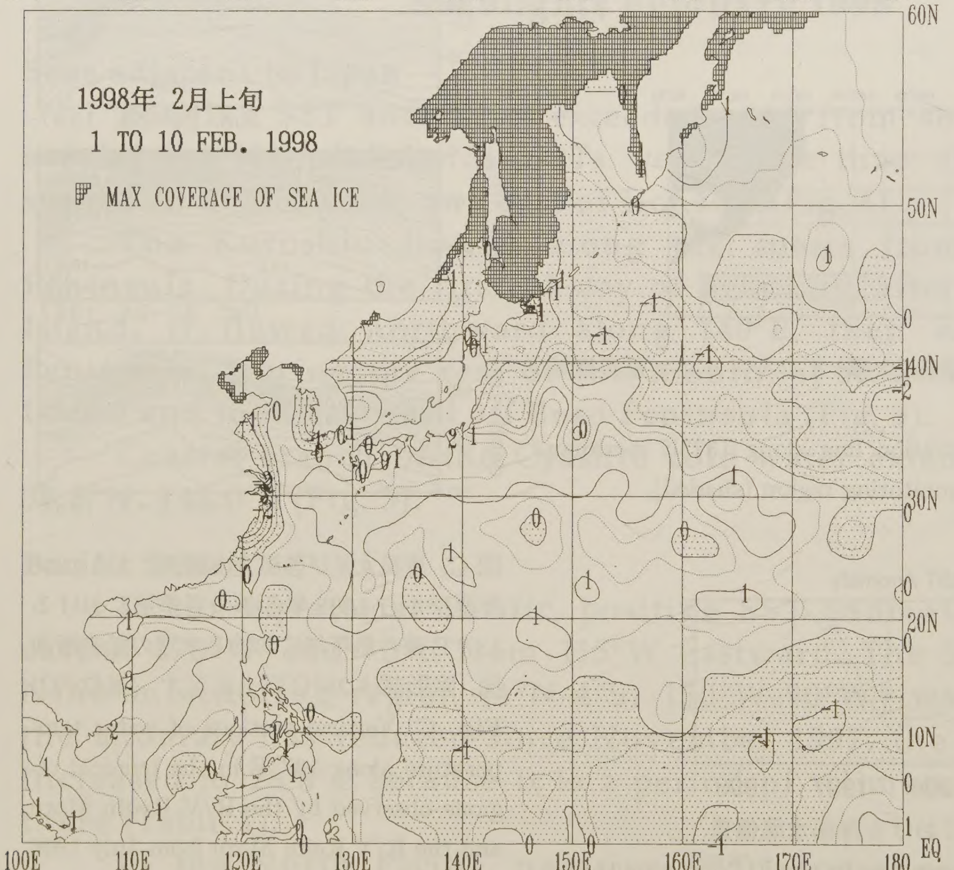
図 C. 凌風丸及び啓風丸の観測による 1996 年夏季から 1998 年冬季の各季節における 137°E 線の熱帯域における水温の鉛直断面図. 陰影部は 28°C 以上を示す. (単位:°C)

Fig. C. Vertical sections of water temperature along 137°E in the tropical regions observed by the R/V Ryofu Maru and the R/V Keifu Maru from July 1996 to January 1998. Values greater than 28°C are shaded.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	21.7	1.4
御前崎(47655)	10.8	0.3
八丈島(47678)	17.0	0.3
小名浜(47598)	8.1	-1.6
宮　古(47585)	7.4	0.0
江　差(47428)	4.9	-
浜　田(47755)	10.7	-

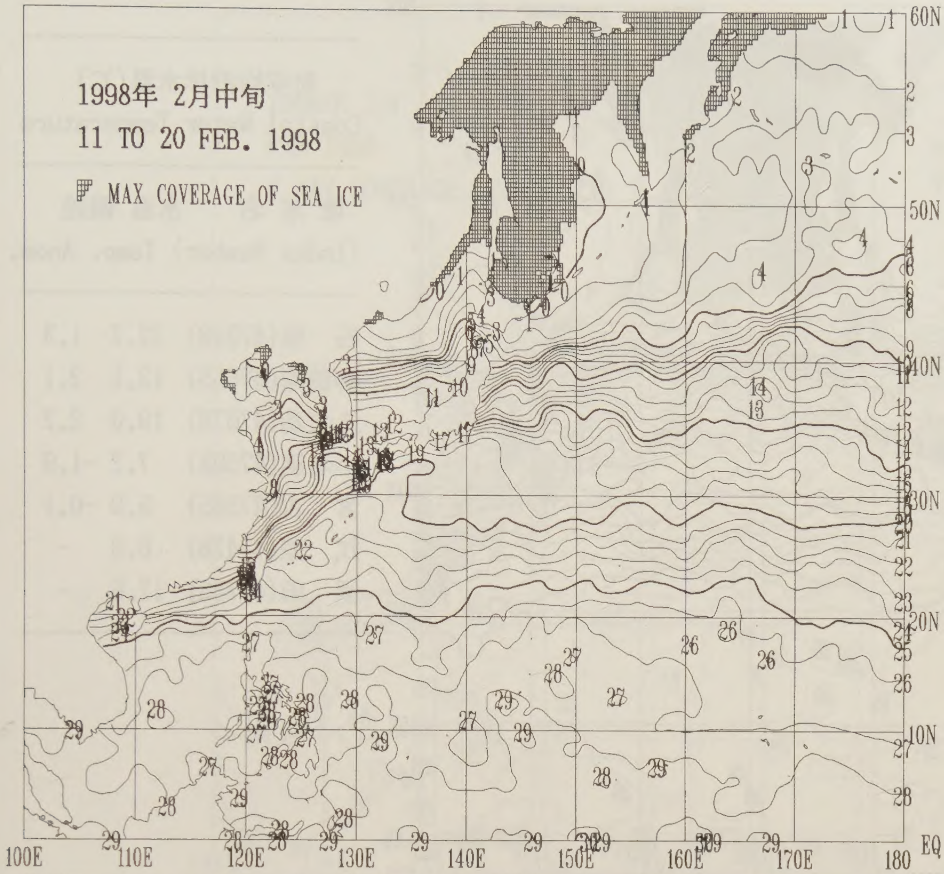


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

地点	位置	水温
日本海	37.9N,134.5E	12.0
四国沖	29.0N,135.0E	20.3
東シナ海	28.2N,126.3E	21.4

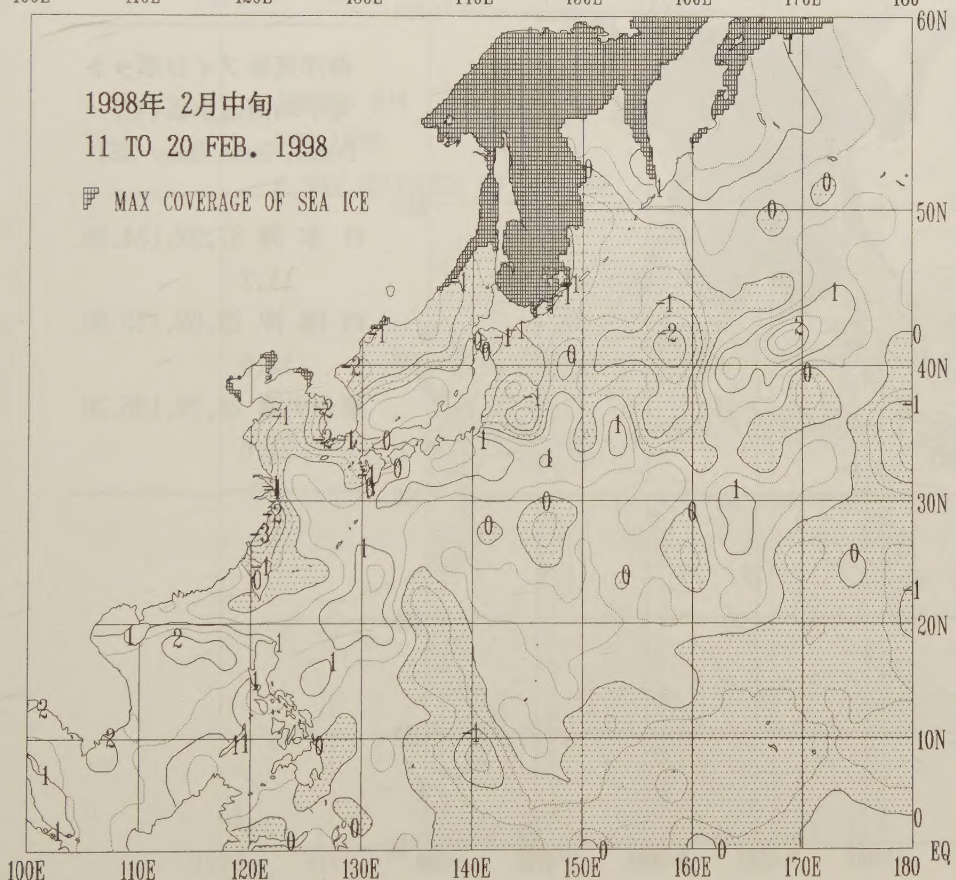
第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1998年 2月上旬)

Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in FEB 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	22.6	1.8
御前崎(47655)	12.7	2.0
八丈島(47678)	18.8	1.9
小名浜(47598)	7.7	-1.9
宮　古(47585)	6.0	-0.8
江　差(47428)	5.9	-
浜　田(47755)	11.9	-

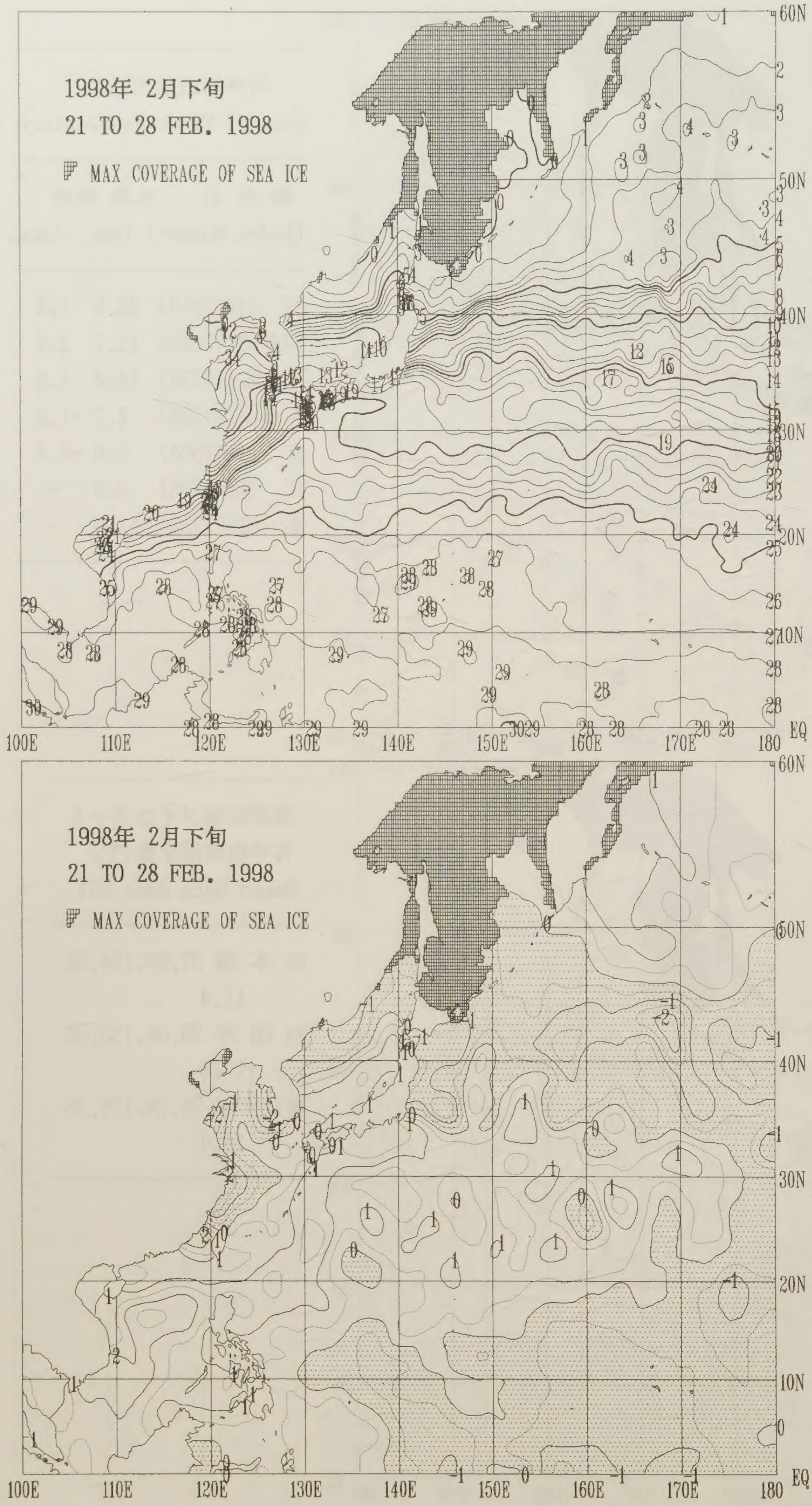


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海 37.9N,134.5E	11.4
四国沖 29.0N,135.0E	19.8
東シナ海 28.2N,126.3E	21.4

第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1998年 2月中旬)

Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in FEB 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

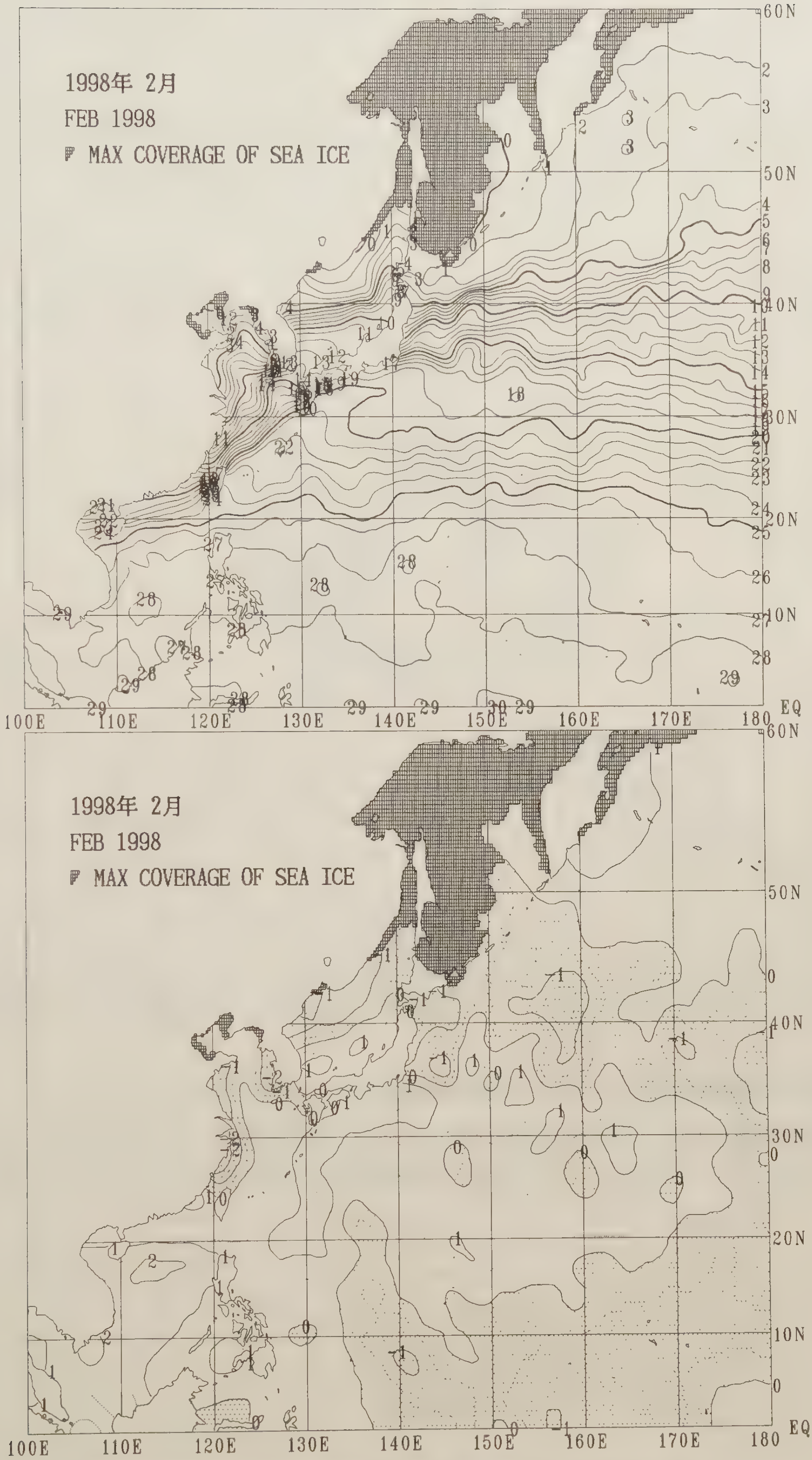
地点名 (Index Number)	水温 Temp.	偏差 Anom.
石垣(47918)	22.2	1.3
御前崎(47655)	13.1	2.1
八丈島(47678)	19.0	2.2
小名浜(47598)	7.2	-1.9
宮古(47585)	5.9	-0.1
江差(47428)	6.9	-
浜田(47755)	12.6	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

地点	位置	SST
日本海	37.9N,134.5E	11.2
四国沖	29.0N,135.0E	19.5
東シナ海	28.2N,126.3E	21.6

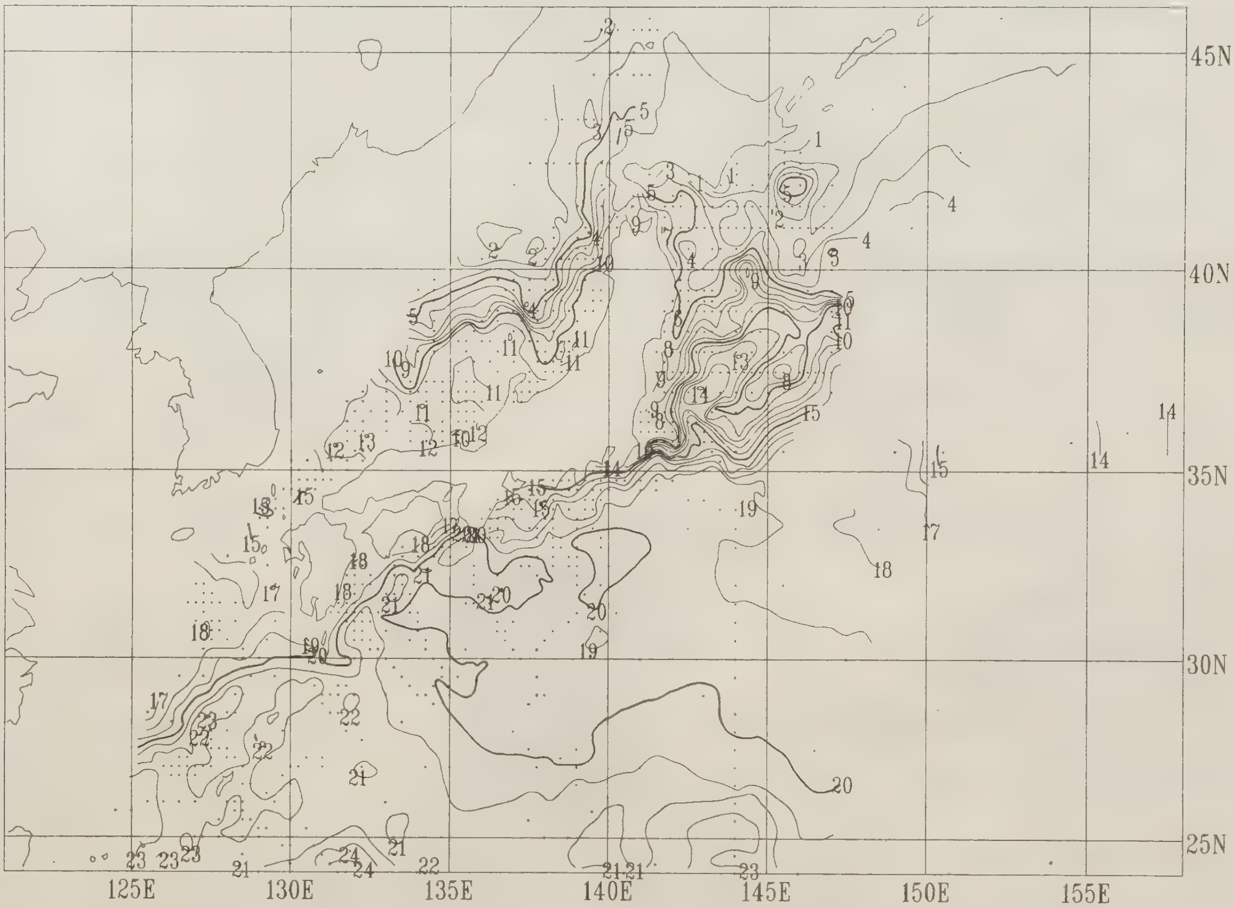
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Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in FEB 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



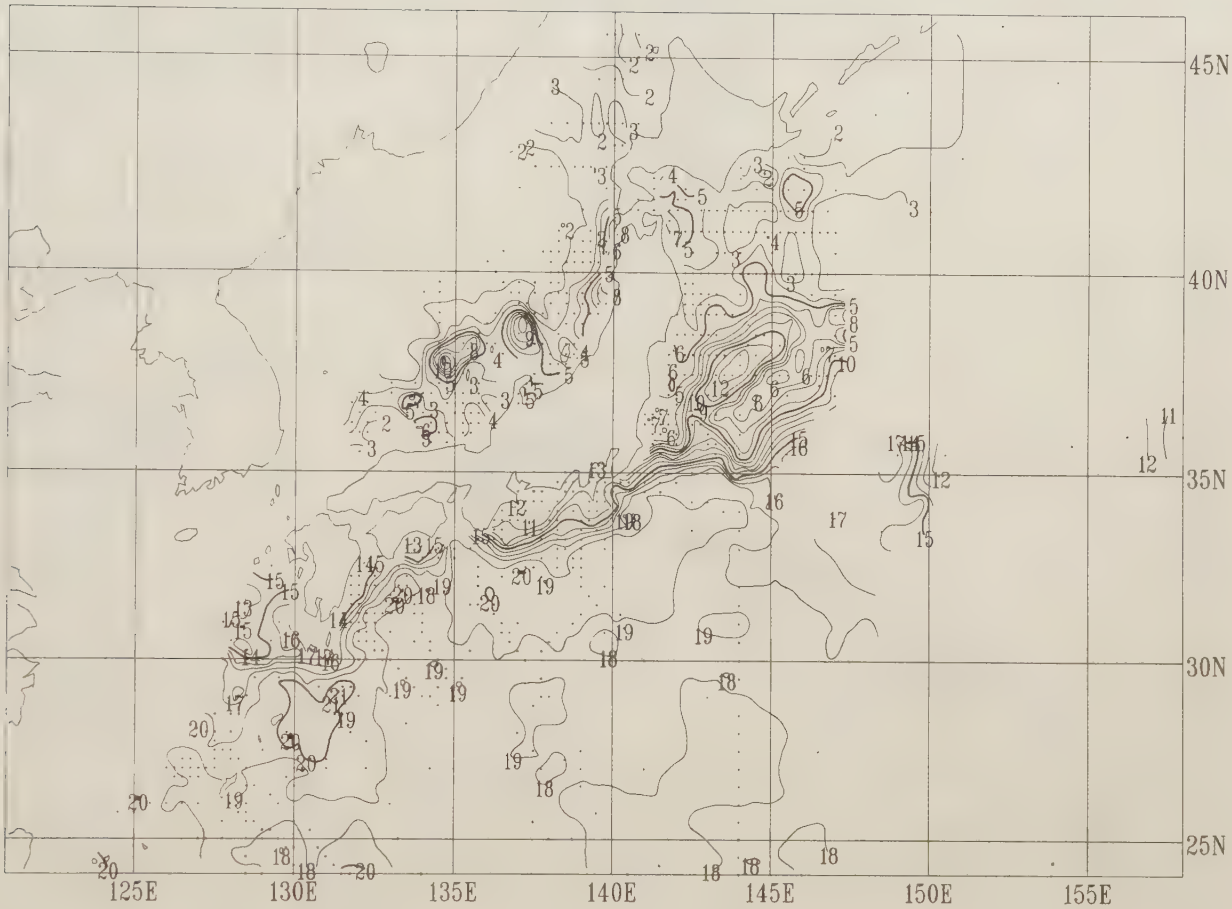
第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1998年 2月)

Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for FEB 1998. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



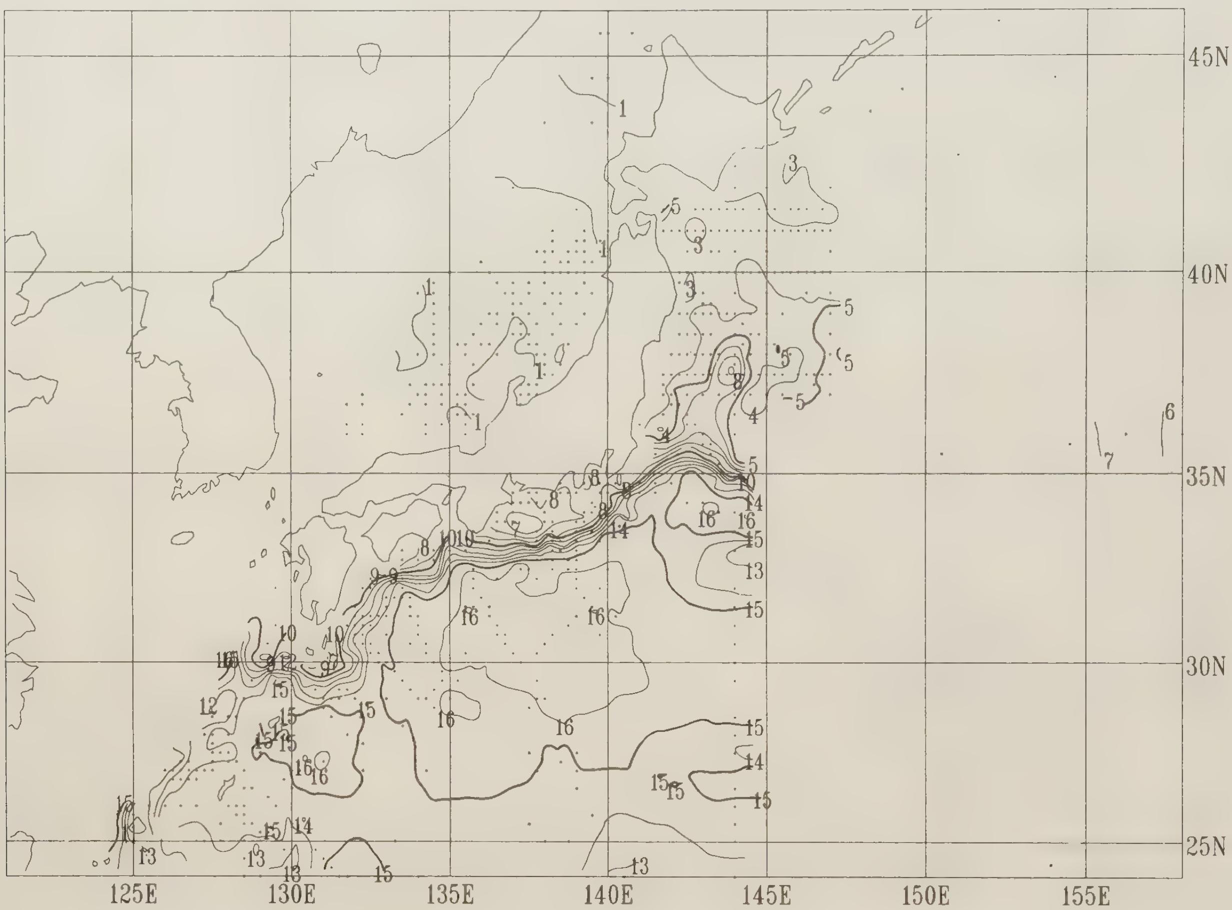
第5図　日本近海表層水温図(深さ100m) (1998年 2月)

Fig.5 Subsurface (100m) temperatures in the seas adjacent to Japan for FEB 1998. Contour interval is 1°C. Observation points are denoted by dots.



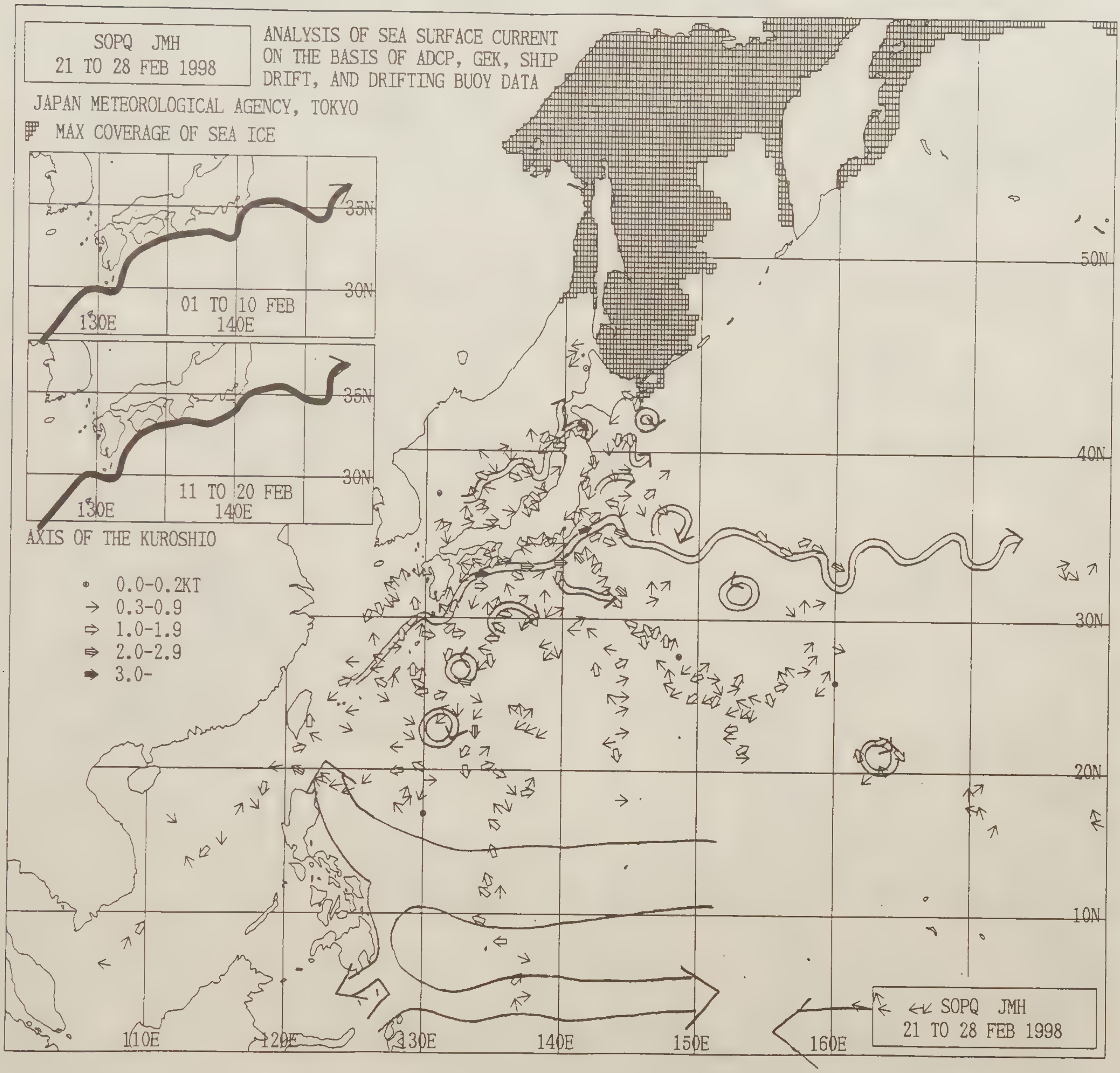
第6図　日本近海表層水温図(深さ200m) (1998年 2月)

Fig.6 Subsurface (200m) temperatures in the seas adjacent to Japan for FEB 1998. Contour interval is 1°C. Observation points are denoted by dots.



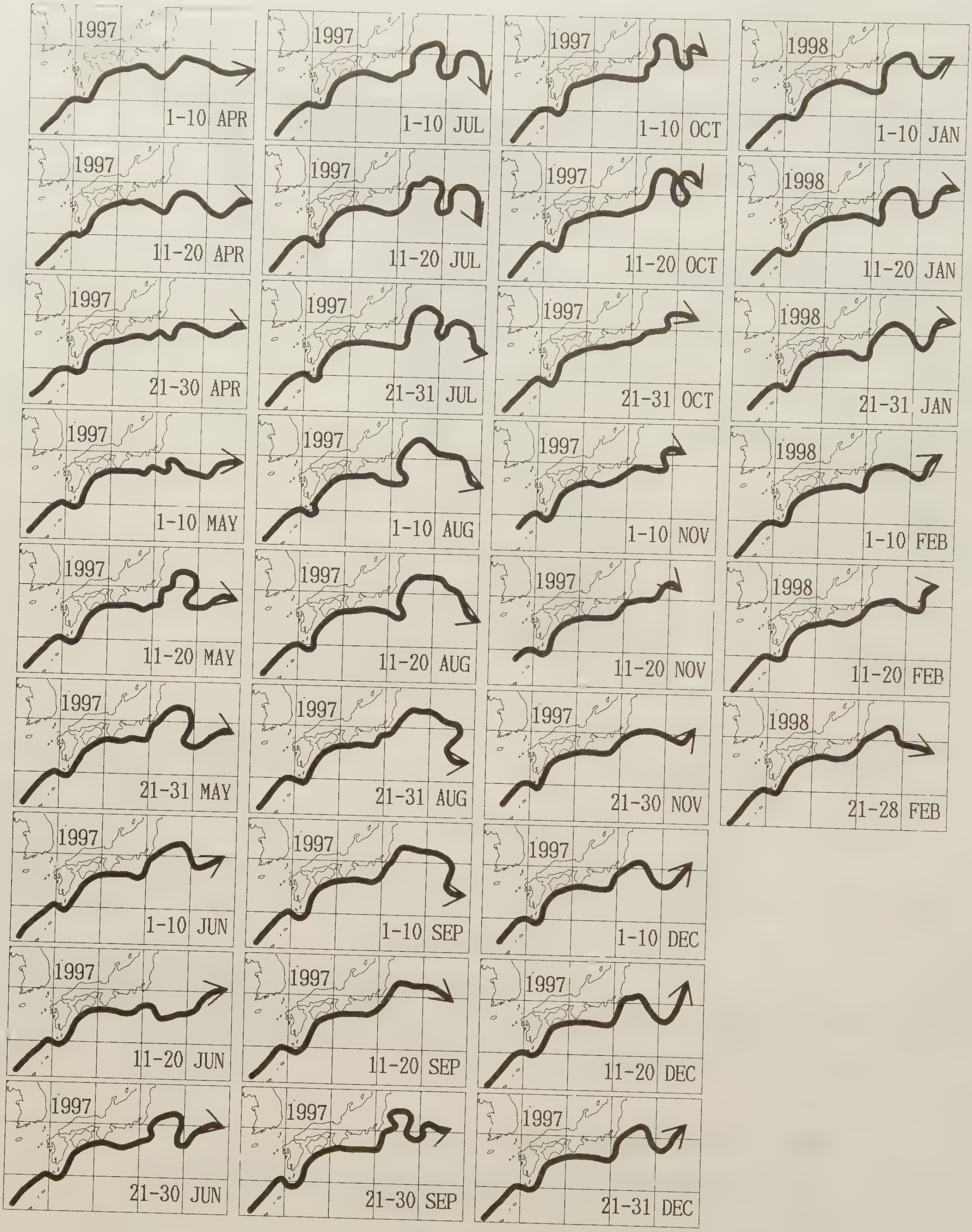
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Fig.7 Subsurface (400m) temperatures in the seas adjacent to Japan for FEB 1998. Contour interval is 1°C. Observation points are denoted by dots.



第8図　北西太平洋海流図（1998年 2月下旬）

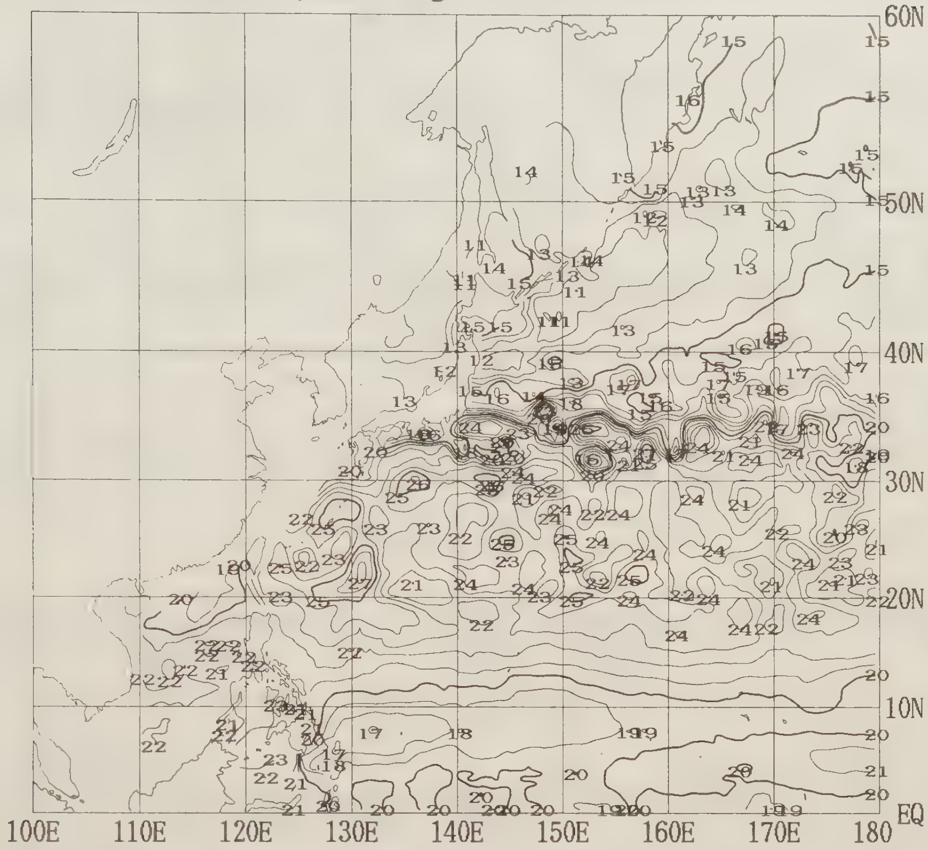
Fig.8 Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in FEB 1998. Small arrows indicate in situ observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.



第9図 旬別黒潮流軸図

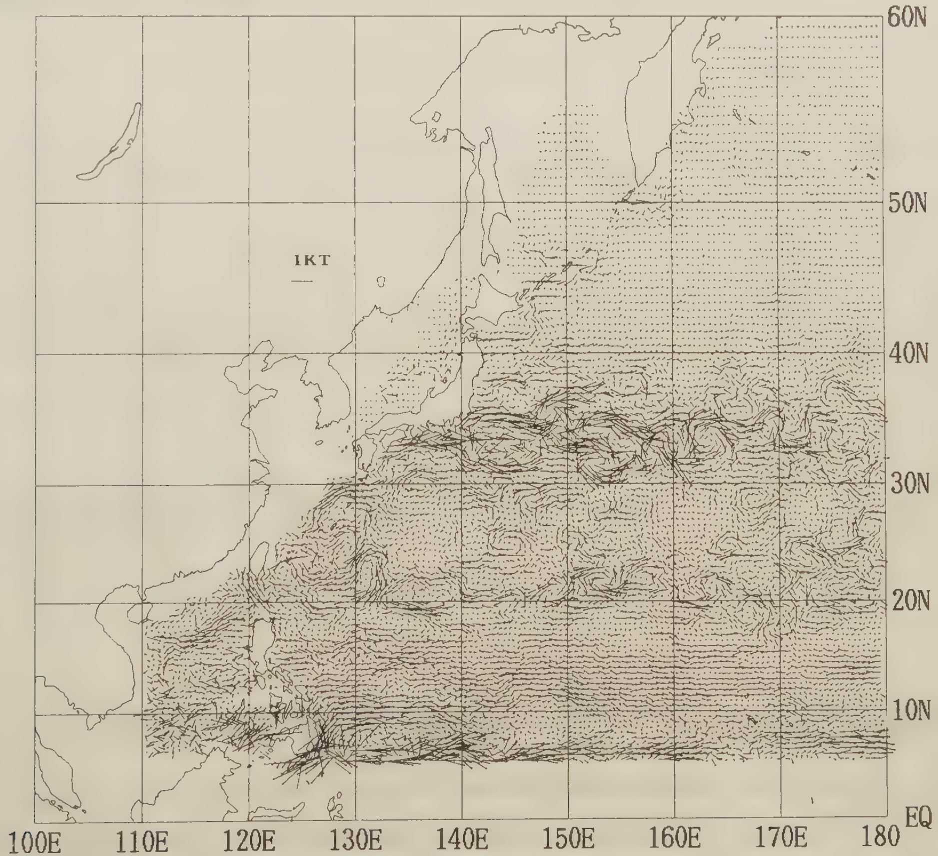
Fig.9 Location of the Kuroshio axis

Sea surface dynamic heights and current distribution



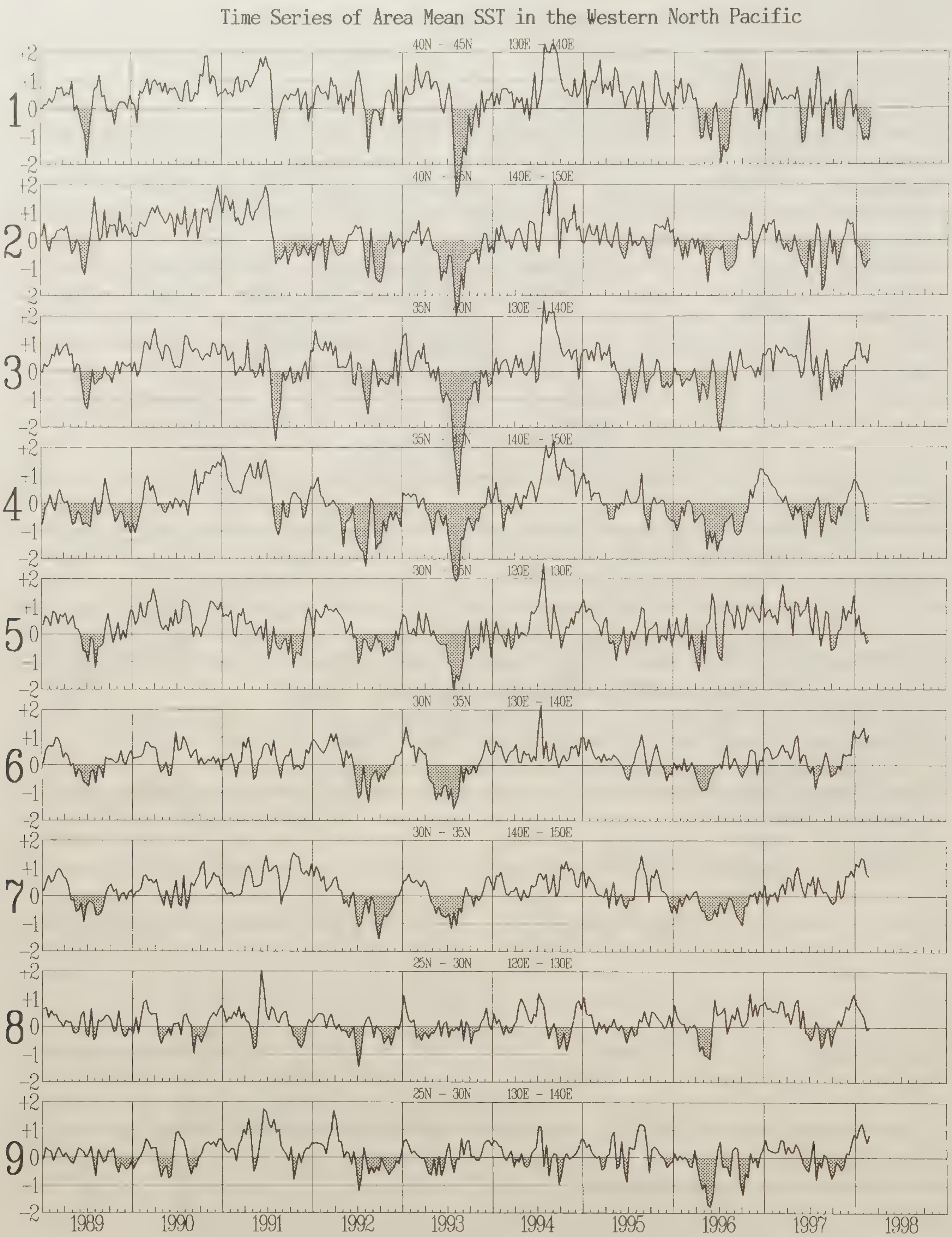
第10図 北西太平洋力学的海面高度分布図(1998年 2月22日)

Fig.10 Sea surface dynamic heights (10cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (FEB 22, 1998).
1500db surface is assumed to be the surface of no motion.



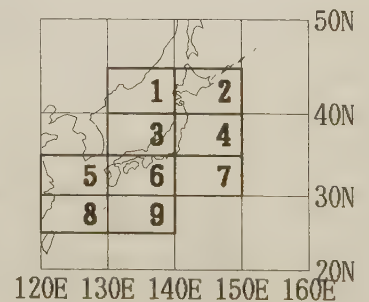
第11図 北西太平洋海流ベクトル図(1998年 2月22日)

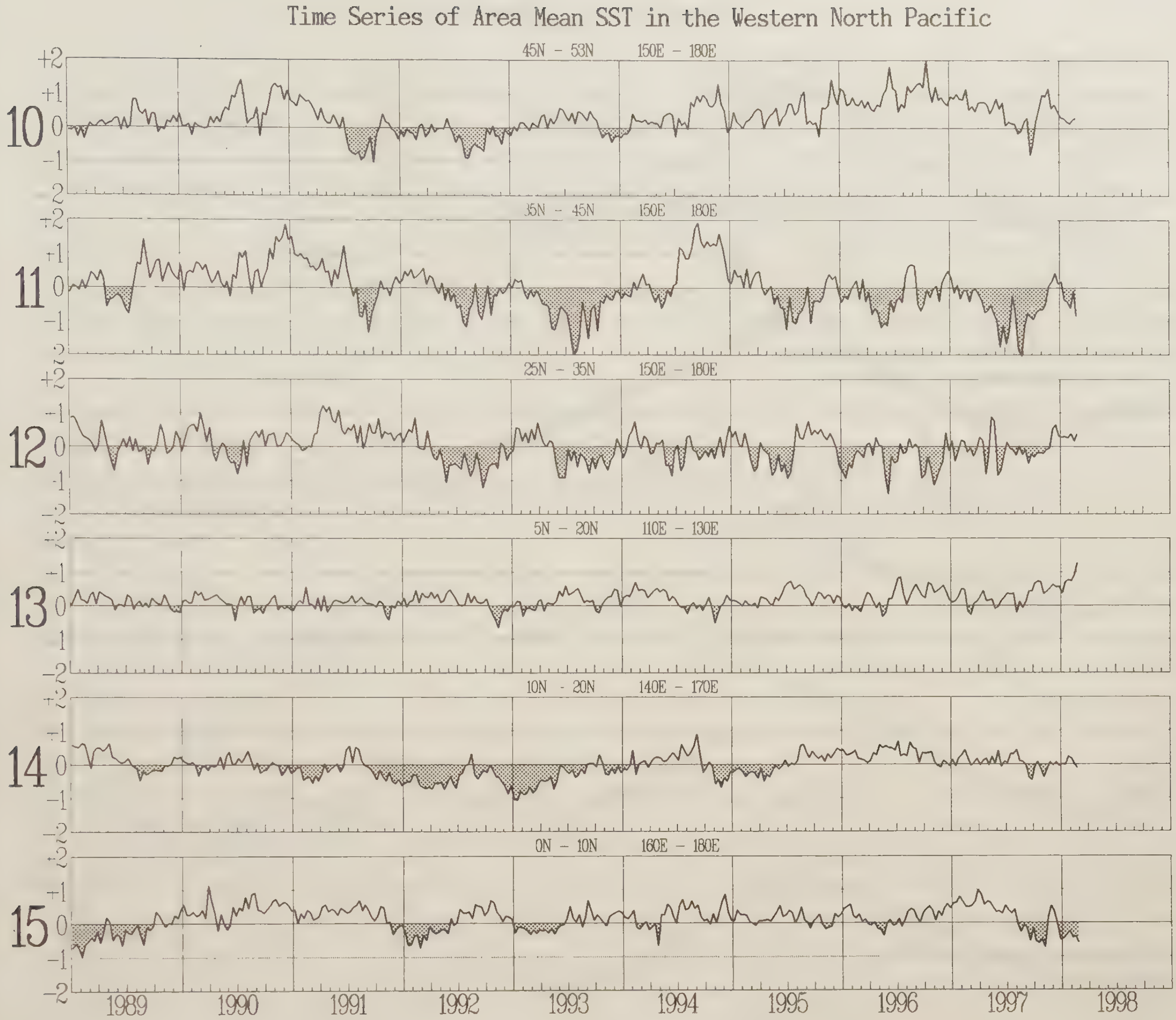
Fig.11 Sea surface current vectors in the western North Pacific (FEB 22, 1998).
Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.



第12図　海域別旬平均海面水温平年偏差時系列図

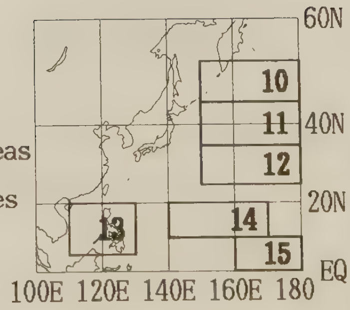
Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

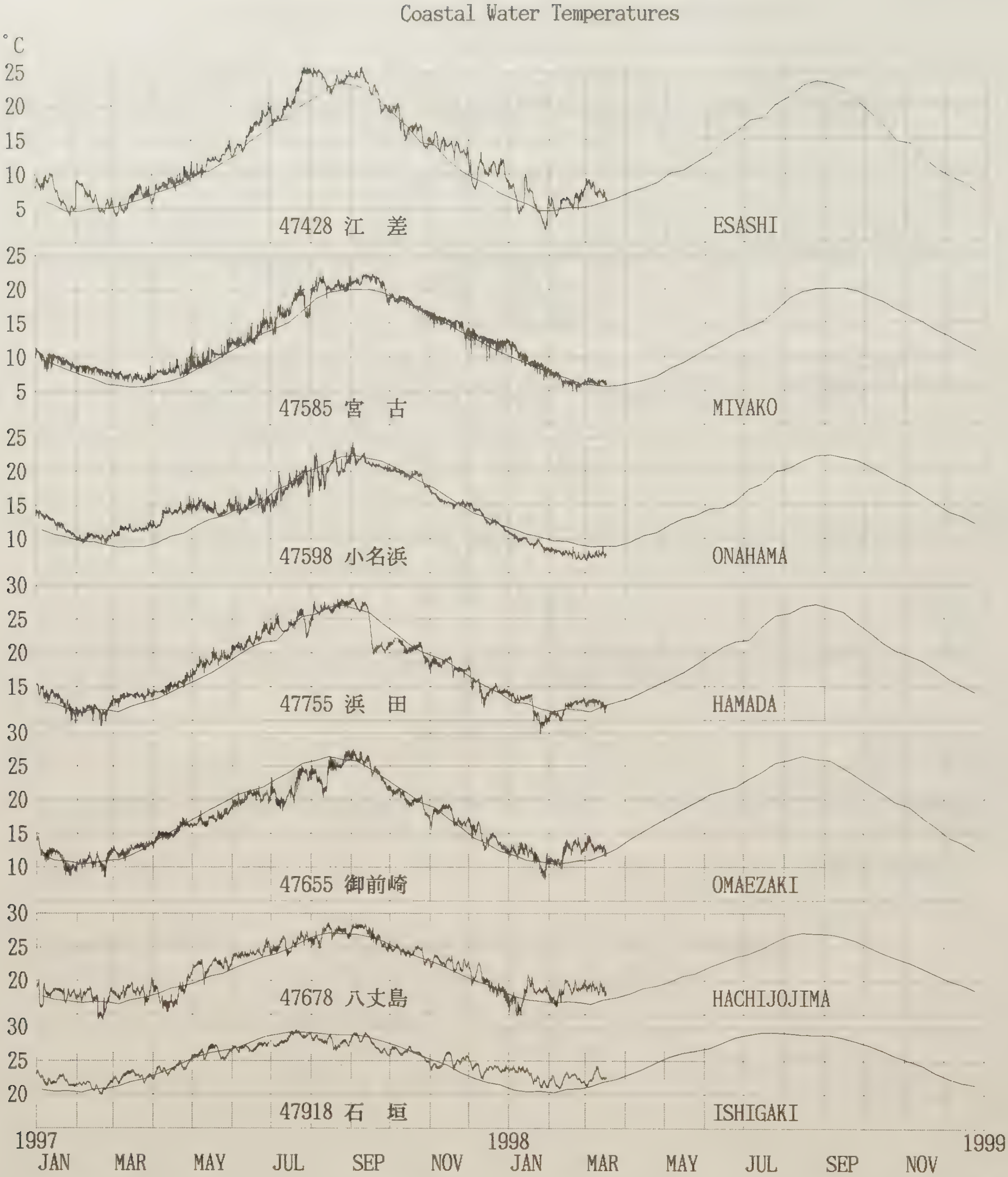


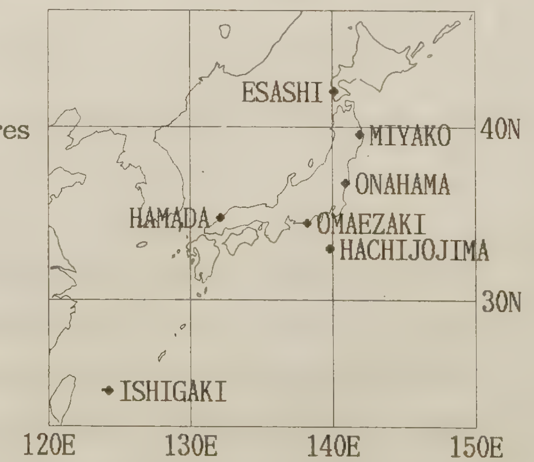


第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).



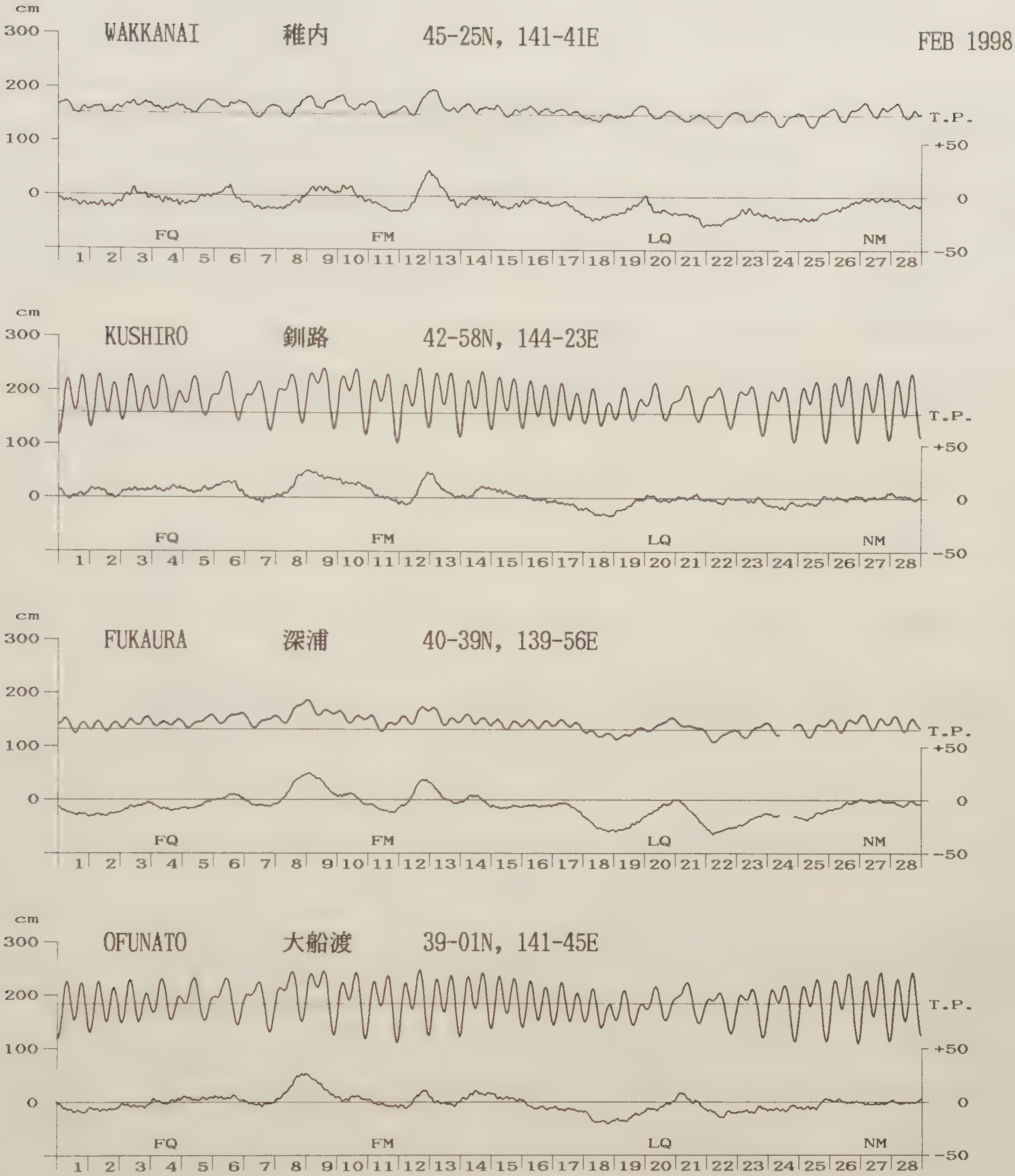




第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.

Time Series of Sea Level



第14図 沿岸潮位時系列図 (1998年 2月)

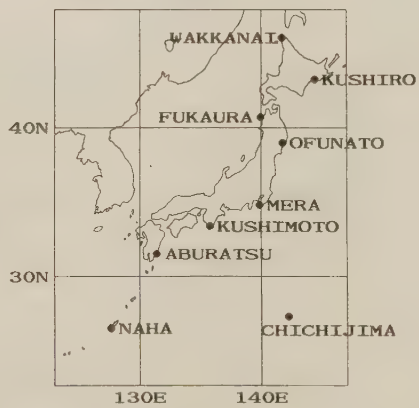
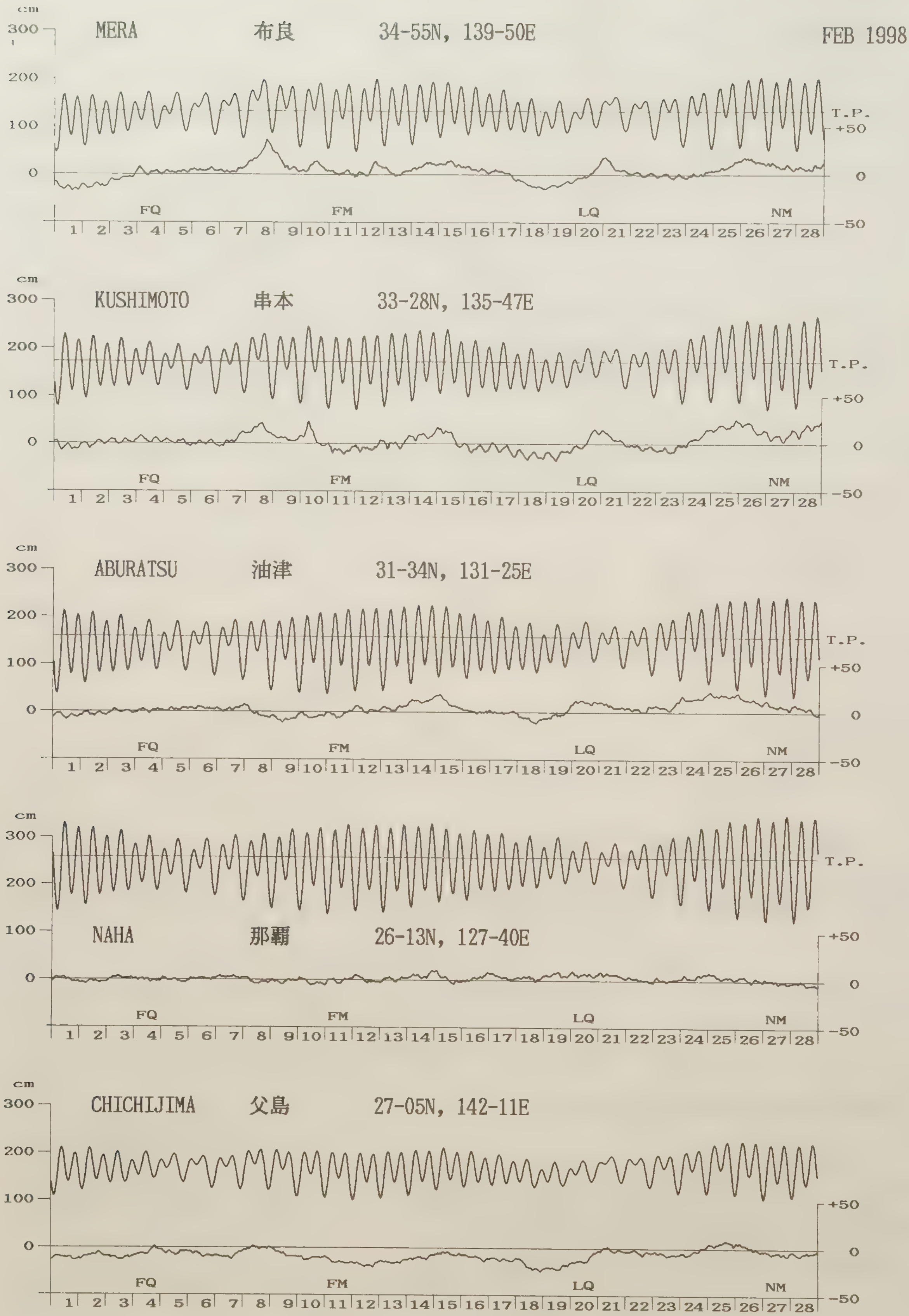


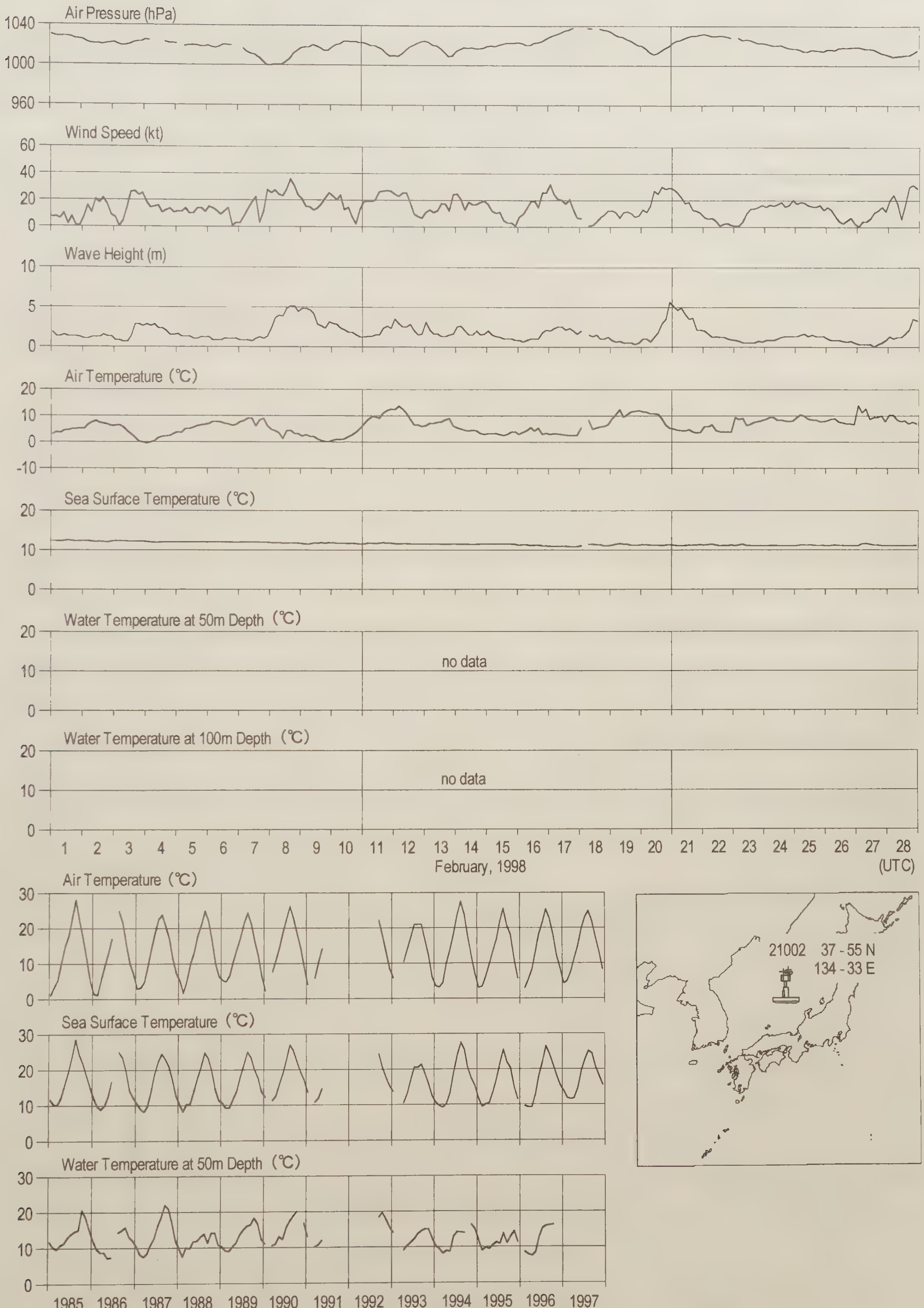
Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.

FM: full moon, FQ: first quarter
NM: new moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



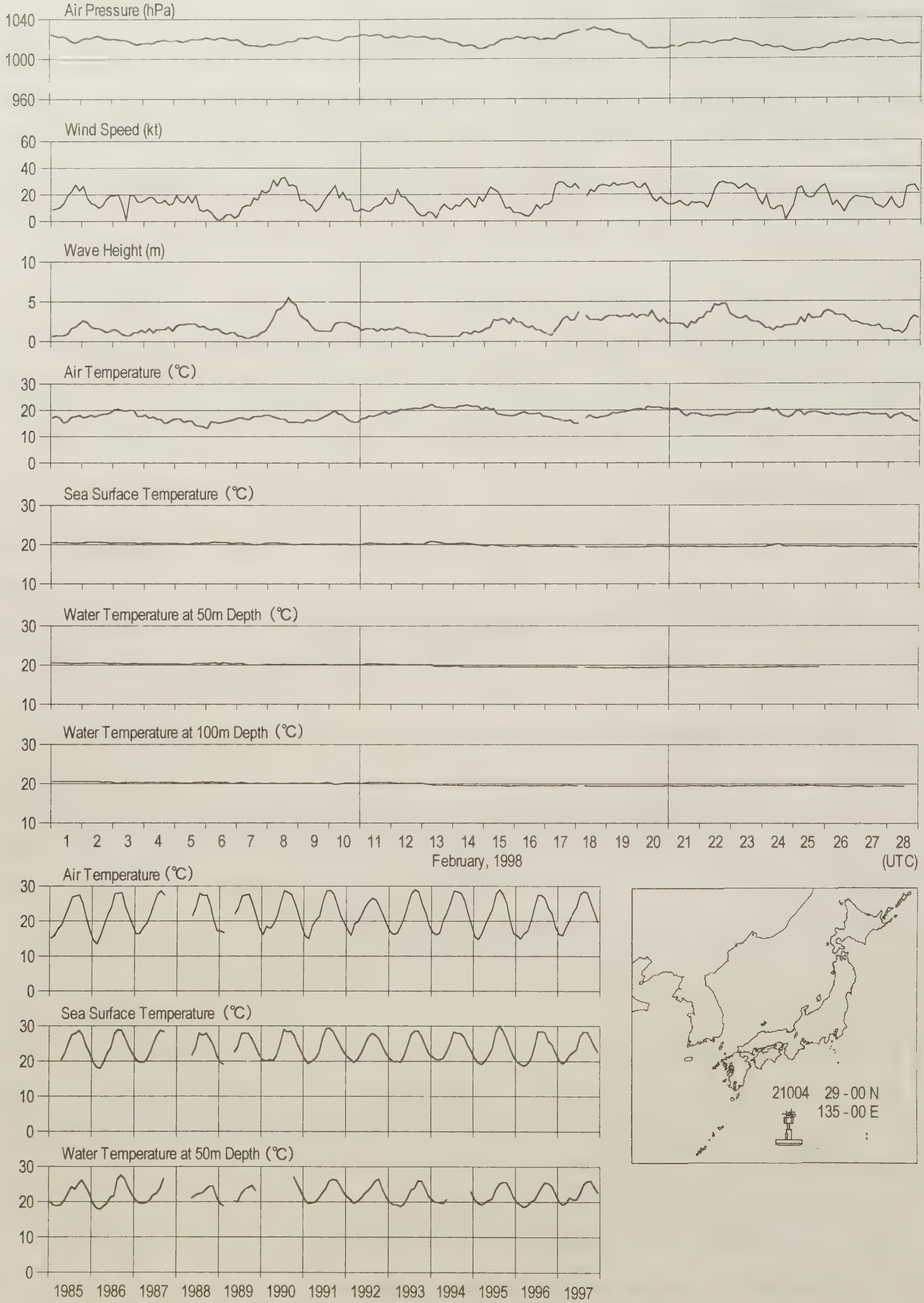
第14図 つづき

Fig.14 continue



第15図　海洋気象ブイロボットによる観測要素の時系列図（日本海：21002）
上段は３時間毎の観測値を、下段は月平均値を示す。

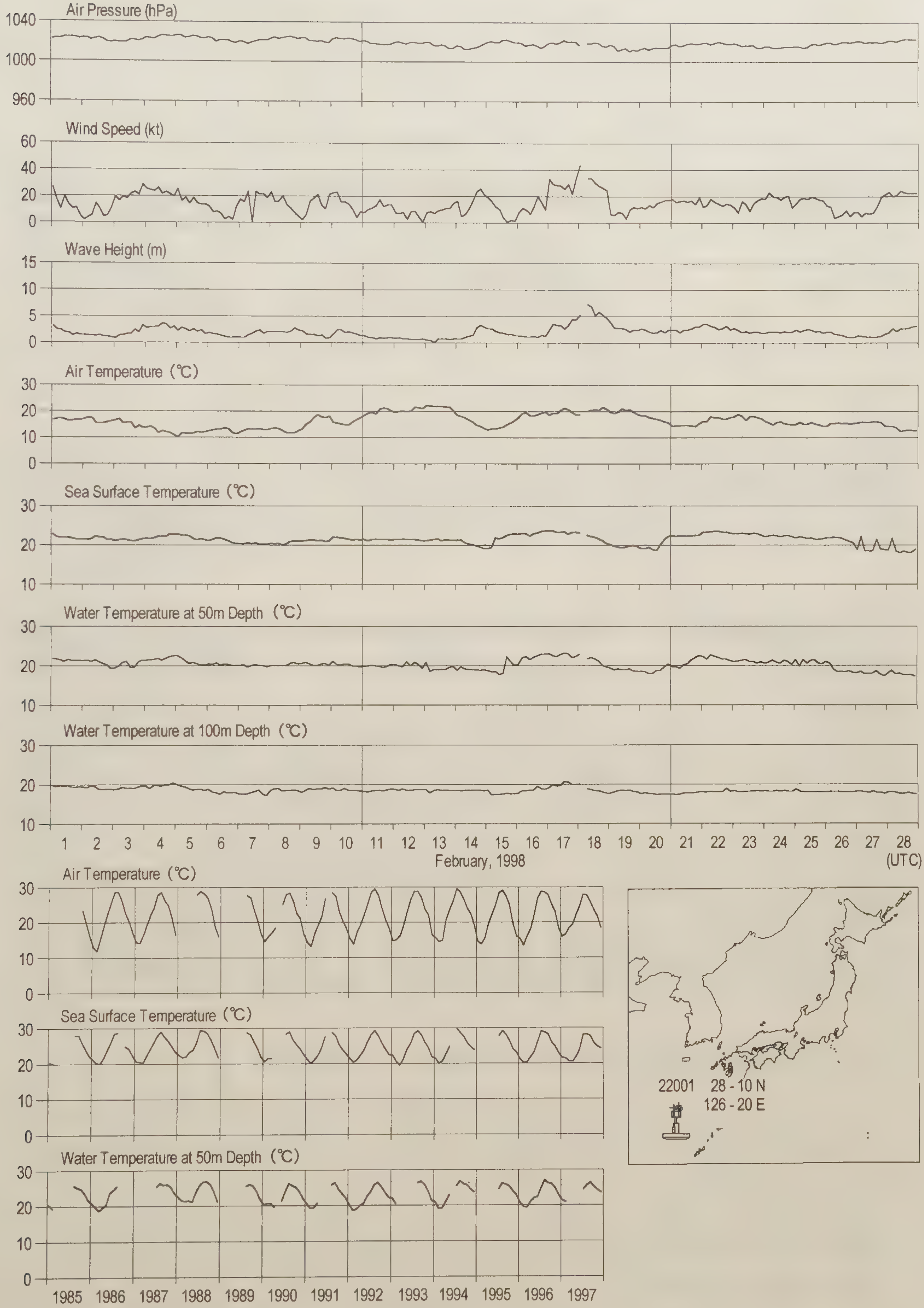
Fig. 15　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



第15図　海洋気象ブイロボットによる観測要素の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

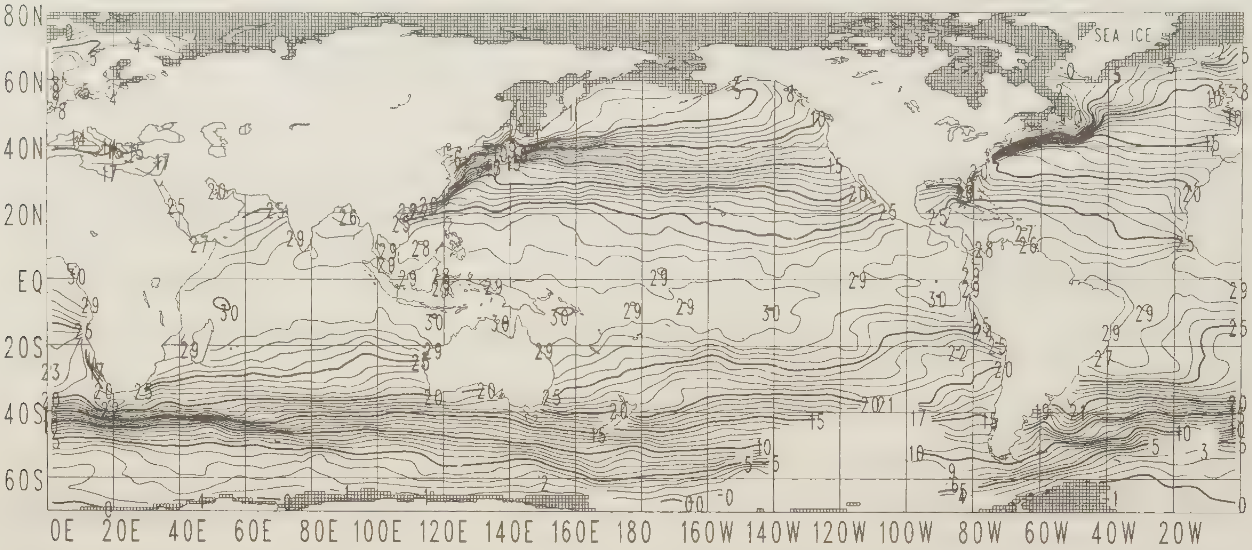
Fig. 15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

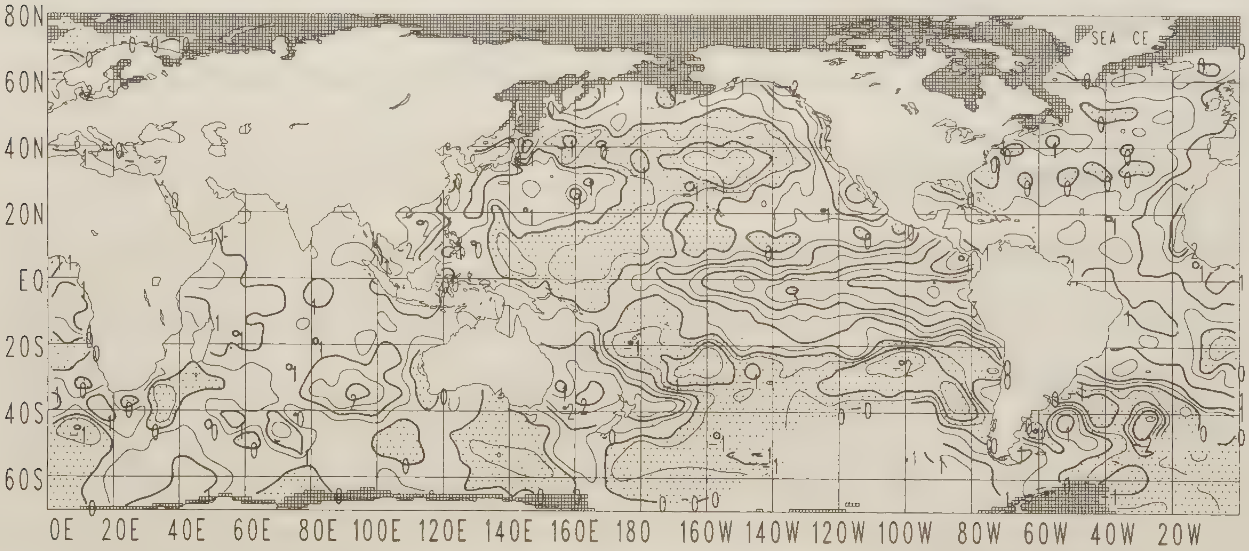
Ocean Data Buoy Observations



第15図　海洋気象ブイロボットによる観測要素の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

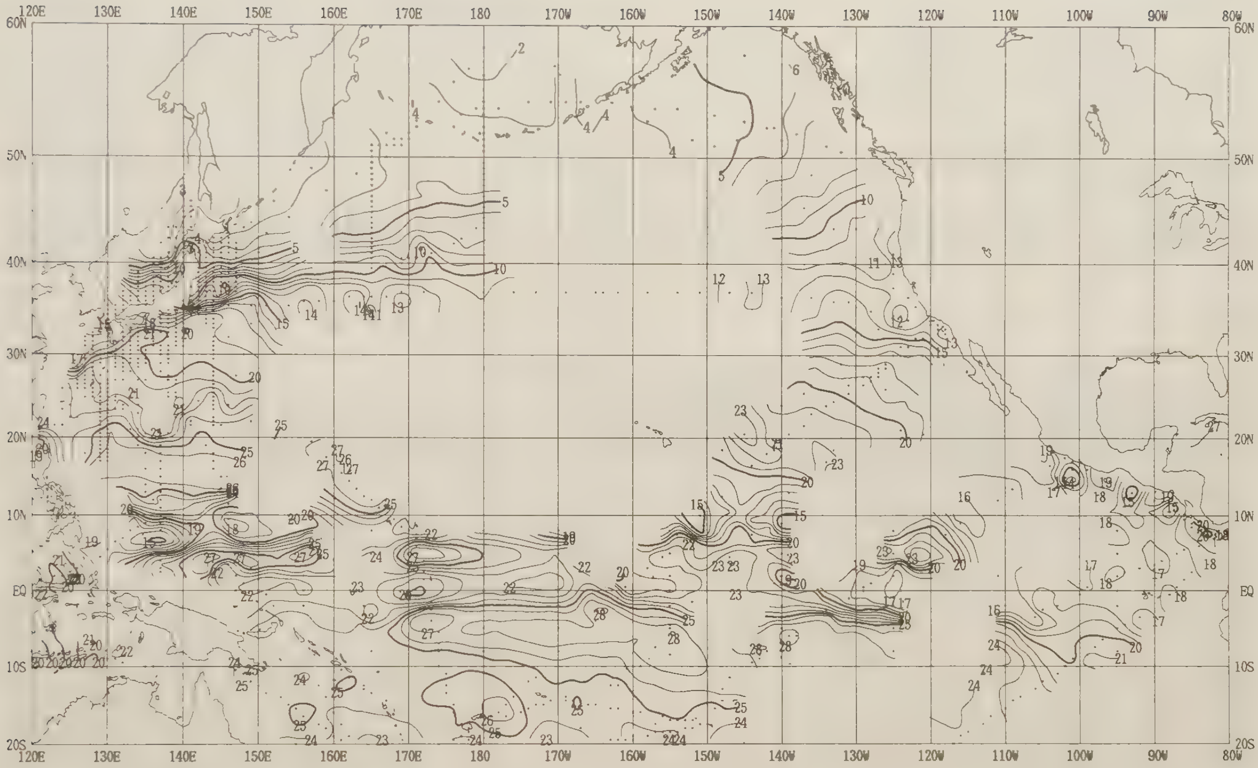
Fig. 15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.





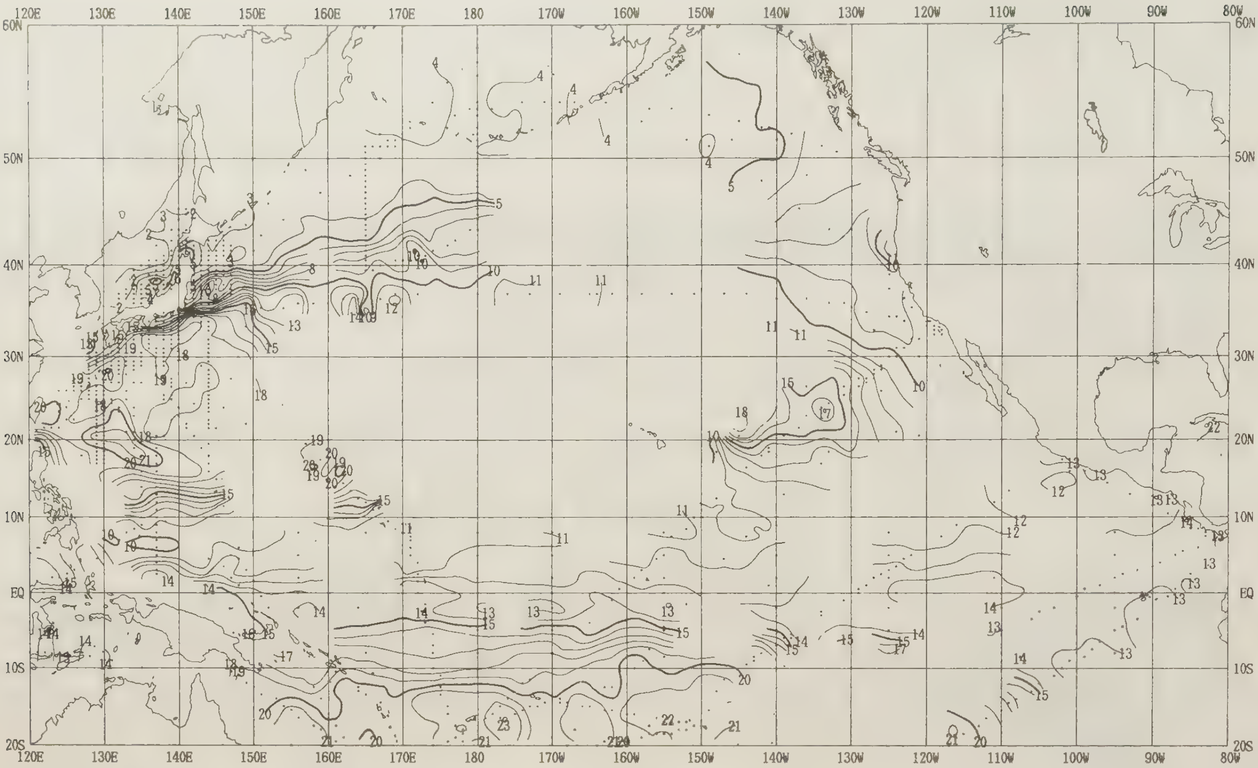
第16図　全球月平均海面水温図（上）及び偏差図（下）（1998年 2月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for FEB 1998. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



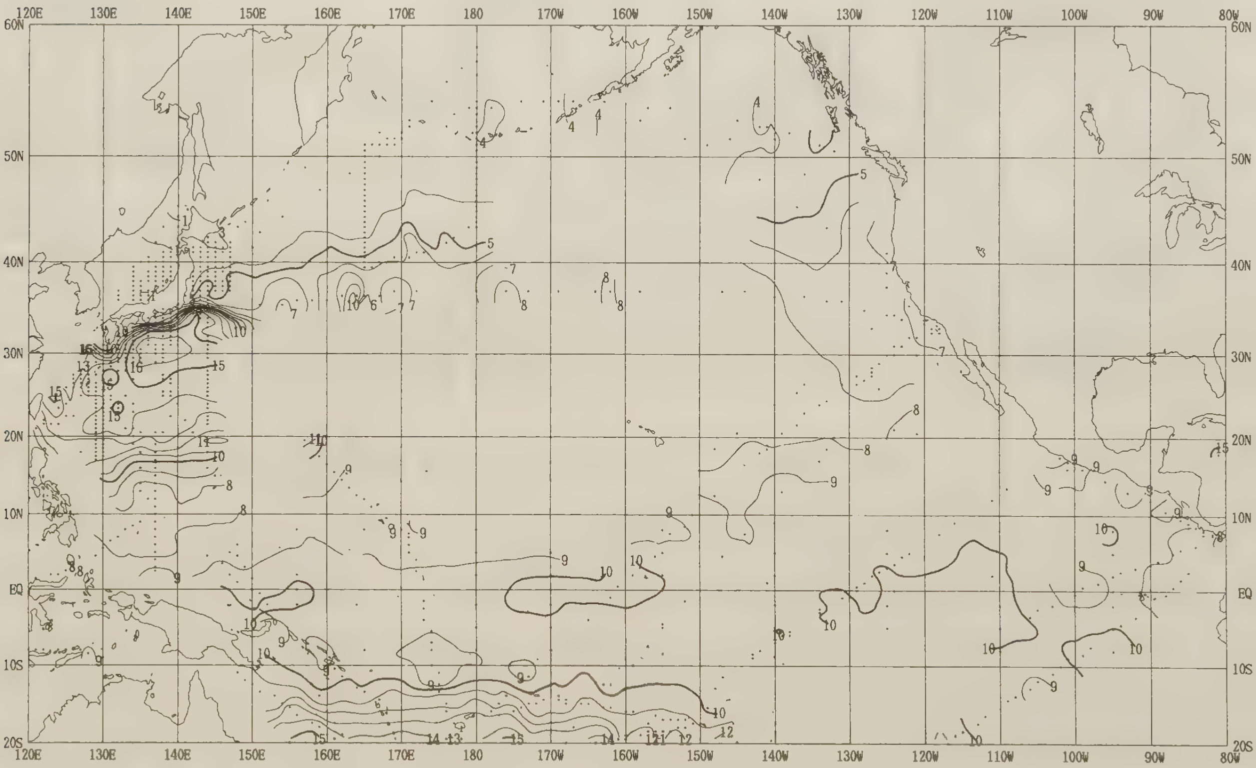
第17図　太平洋表層水温図(深さ100m) (1998年 2月)

Fig.17 Subsurface (100m) temperatures in the Pacific Ocean for FEB 1998. Contour interval is 1°C. Observation points are denoted by dots.



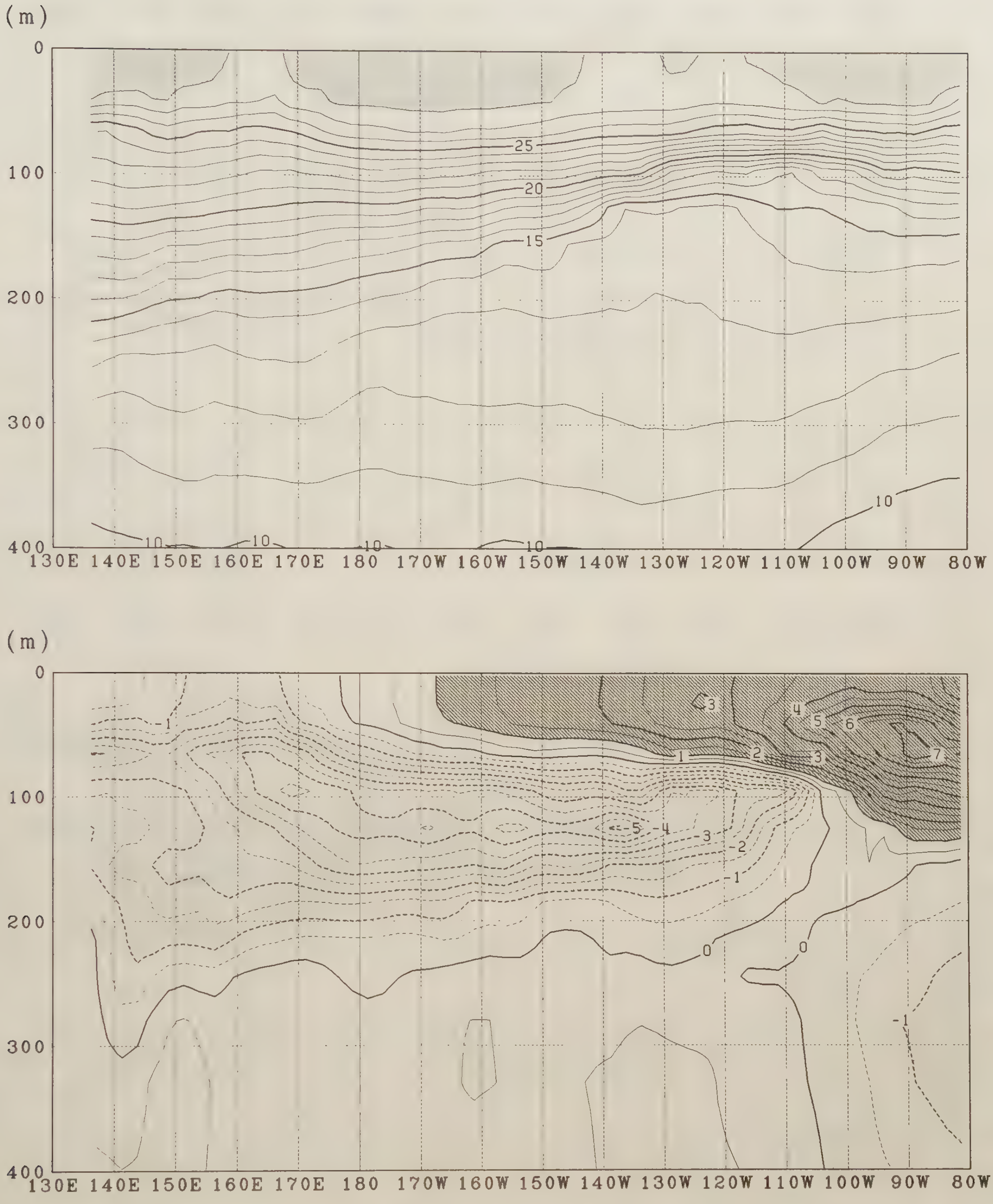
第18図　太平洋表層水温図(深さ200m) (1998年 2月)

Fig.18 Subsurface (200m) temperatures in the Pacific Ocean for FEB 1998. Contour interval is 1°C. Observation points are denoted by dots.



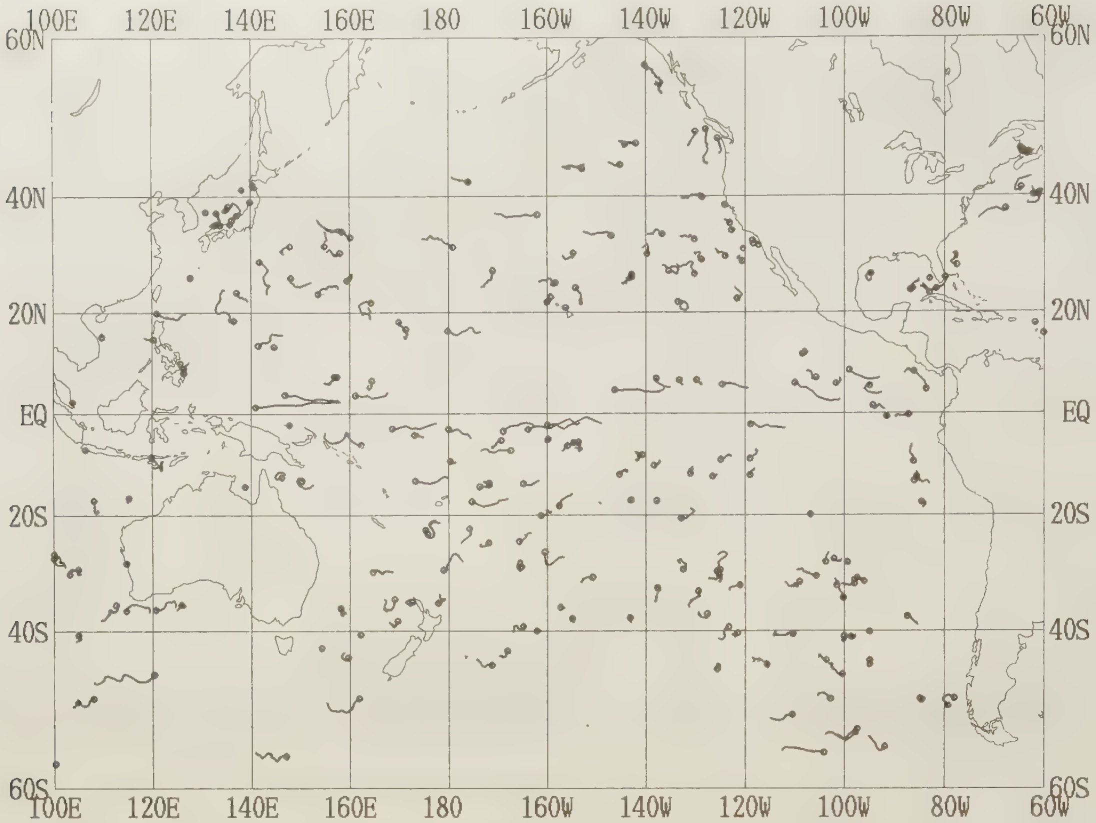
第19図　太平洋表層水温図(深さ400m) (1998年 2月)

Fig.19 Subsurface (400m) temperatures in the Pacific Ocean for FEB 1998. Contour interval is 1°C. Observation points are denoted by dots.



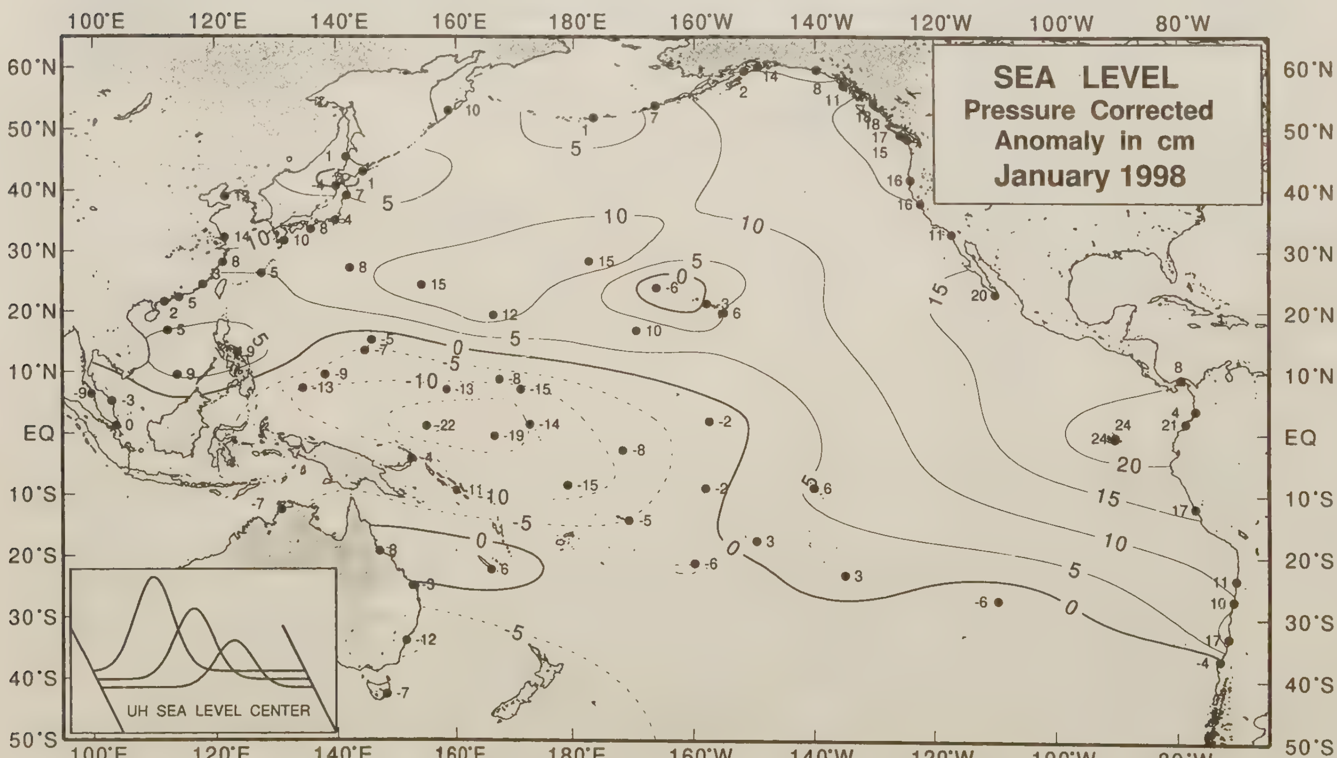
第20図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1998年 2月）

Fig.20 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for FEB 1998. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1996 base period means.



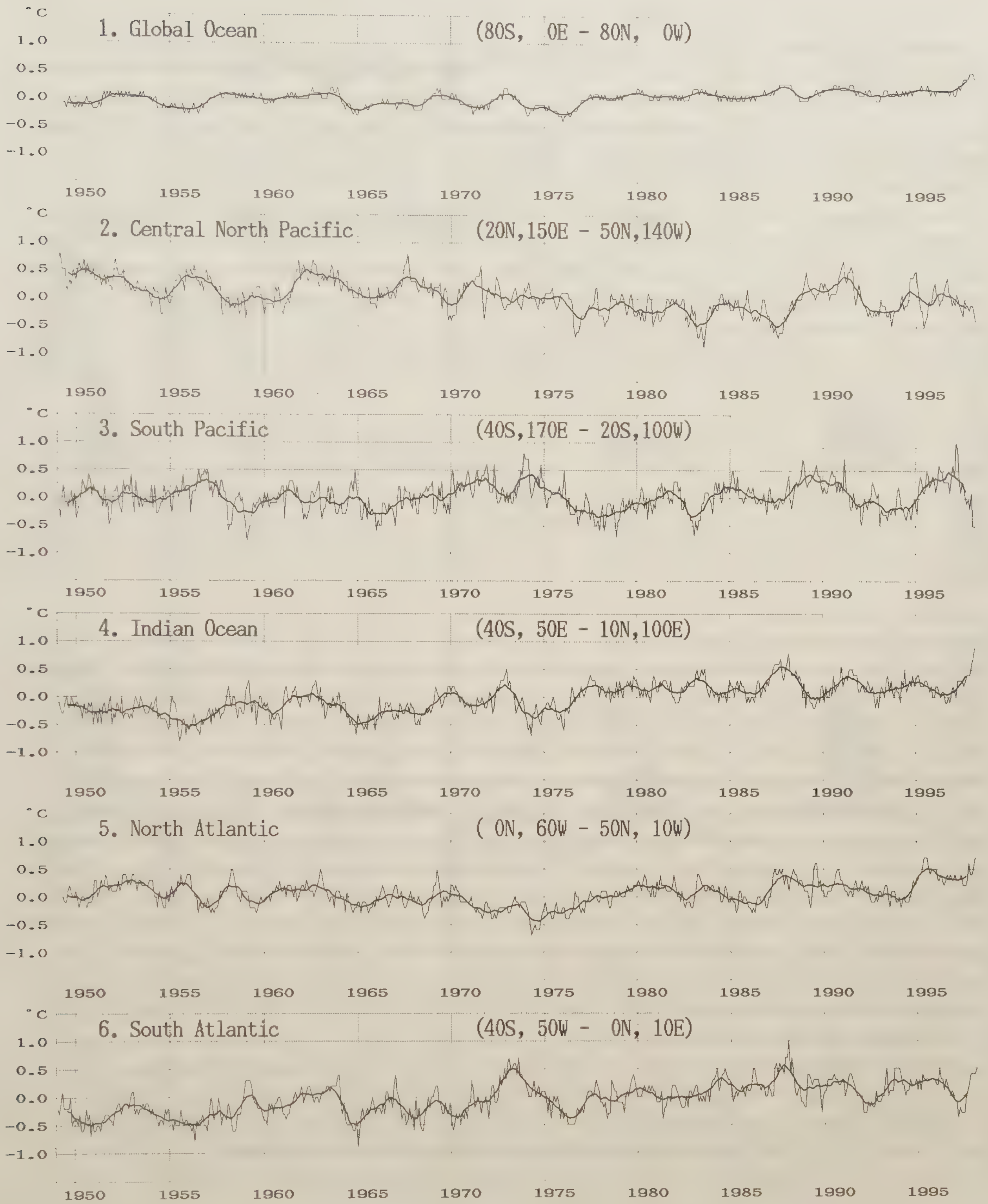
第21図　太平洋ブイ流跡図(1998年 2月)

Fig.21　Movements of drifting buoys in the Pacific Ocean during FEB 1998.
Each track is for one buoy.　Small circles represent last positions for the month.



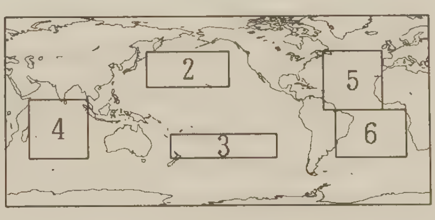
第22図　太平洋海面水位偏差図 (1998年 1月)

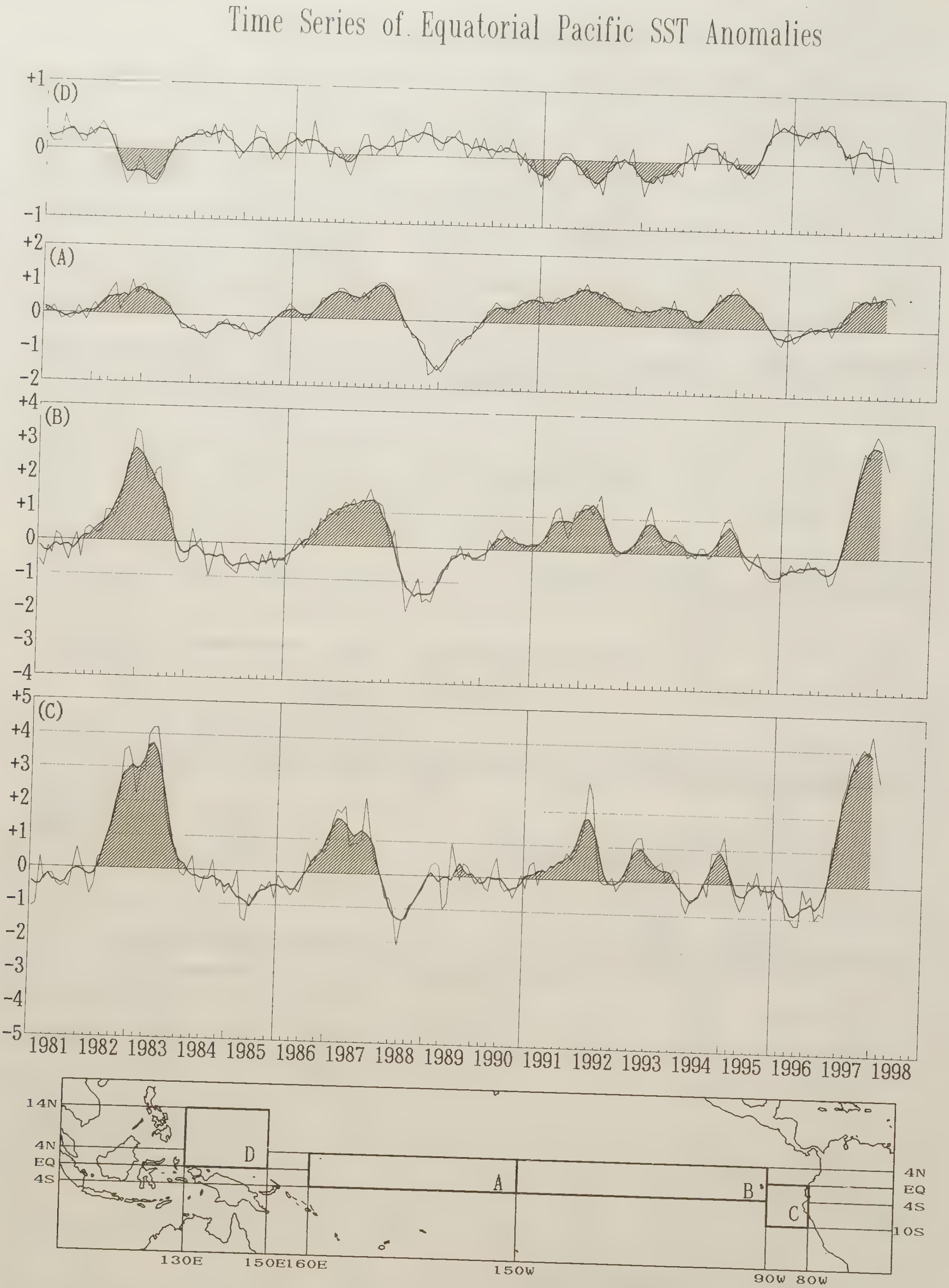
Fig.22　Monthly sea level anomalies for JAN 1998 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure.　This figure is prepared by the SOC of ISLP-PAC, Dept. of Oceanography, Univ. of Hawaii.



第23図 海域平均海面水温偏差の長期変動

Fig.23 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.





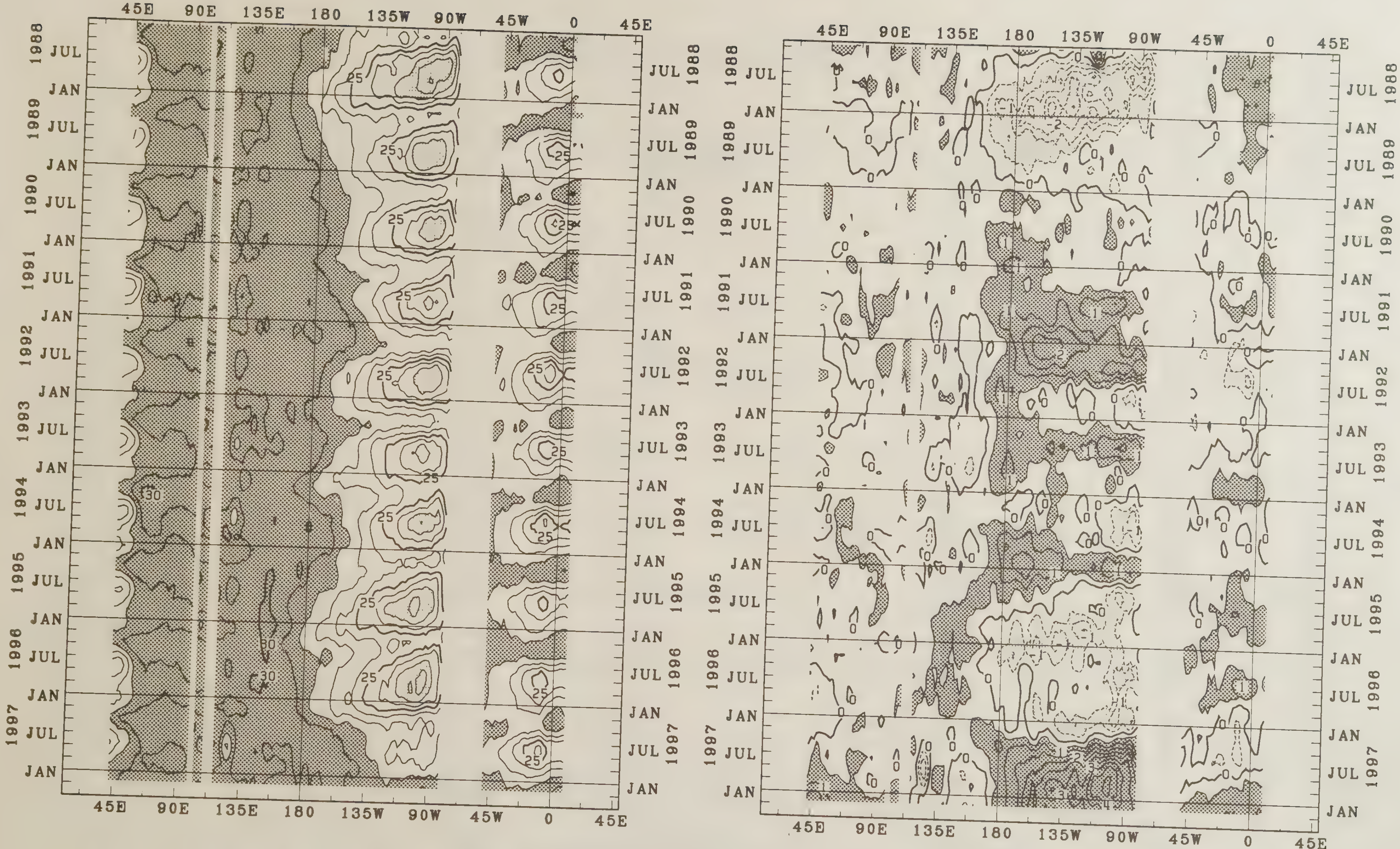
第24図　太平洋赤道域の海面水温偏差時系列図

Fig.24 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

MONTH	SEA SURFACE TEMPERATURE AND ANOMALY (°C) REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	SEA LEVEL PRESSURE ANOMALY (hPa) TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 96	29.0	0.5	27.9	-0.1	25.0	-0.4	24.1	-0.2	0.8	1.0	-0.7
FEB 96	28.6	0.3	27.6	-0.4	25.7	-0.5	26.0	0.3	0.1	-0.2	-0.5
MAR 96	28.8	0.4	27.8	-0.3	26.7	-0.2	25.9	0.0	0.7	1.0	-0.3
APR 96	29.3	0.5	28.1	-0.1	26.7	-0.4	24.1	-1.0	0.8	0.5	-0.5
MAY 96	29.6	0.5	28.5	0.0	26.2	-0.4	22.9	-1.0	0.3	1.2	1.2
JUN 96	29.7	0.4	28.6	0.1	25.7	-0.4	21.5	-1.2	1.4	1.6	-0.2
JUL 96	29.8	0.6	28.4	-0.1	25.1	-0.1	20.4	-1.2	0.7	0.6	-0.6
AUG 96	29.6	0.5	28.4	0.0	24.3	-0.3	20.5	-0.1	0.4	0.4	-0.3
SEP 96	29.8	0.6	28.4	0.1	24.3	-0.3	19.8	-0.5	0.5	-0.7	-1.7
OCT 96	29.9	0.6	28.5	0.1	24.3	-0.3	20.4	-0.3	0.4	-0.1	-0.8
NOV 96	29.5	0.3	28.2	-0.2	24.3	-0.3	20.5	-1.0	-0.0	-0.5	-0.5
DEC 96	29.2	0.3	28.3	0.1	24.1	-0.8	21.8	-0.8	0.8	-0.3	-1.9
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9
JUN 97	29.6	0.3	29.3	0.8	28.1	2.0	25.7	3.0	-2.3	-0.8	2.1
JUL 97	29.5	0.3	29.4	0.9	27.8	2.6	25.5	3.9	-0.8	-0.1	1.2
AUG 97	29.0	-0.1	29.2	0.8	27.7	3.1	24.0	3.4	-2.0	-0.9	2.2
SEP 97	29.0	-0.2	29.4	1.1	27.5	2.9	24.2	3.9	-1.4	0.1	2.7
OCT 97	29.6	0.3	29.1	0.7	27.9	3.3	24.8	4.1	-1.6	-0.2	2.7
NOV 97	29.5	0.3	29.3	0.9	28.2	3.6	25.4	3.9	-1.2	0.4	2.7
DEC 97	29.1	0.2	29.2	1.0	28.3	3.4	27.1	4.5	-0.9	-0.5	1.1
JAN 98	28.3	-0.2	29.0	1.0	28.4	3.0	28.0	3.7	-2.3	-3.6	1.4
FEB 98	28.1	-0.2	28.8	0.8	28.8	2.6	28.8	3.1	-1.8	-0.9	3.5

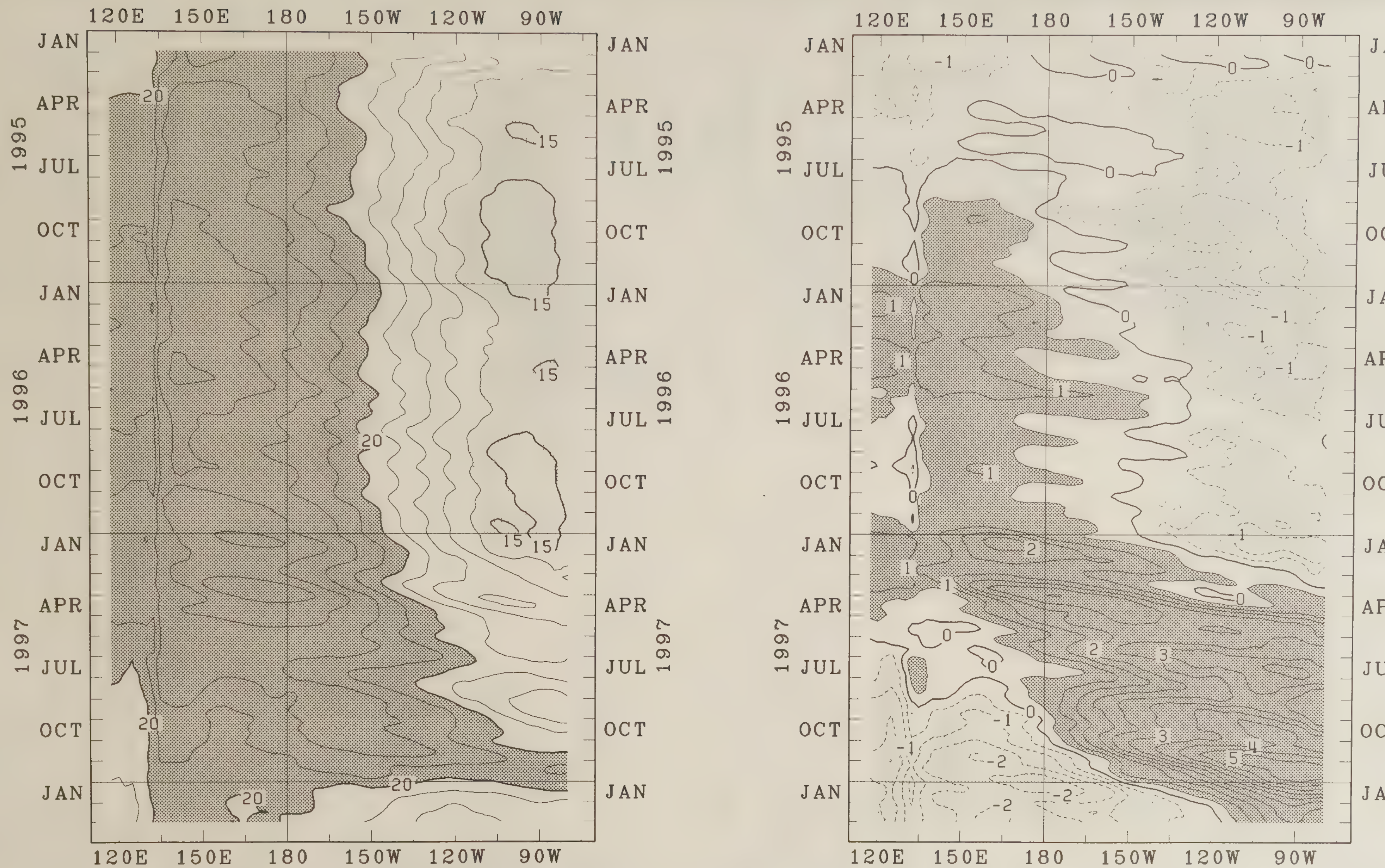
第1表　エルニーニョ監視指数

Table 1 El Nino Monitoring indices



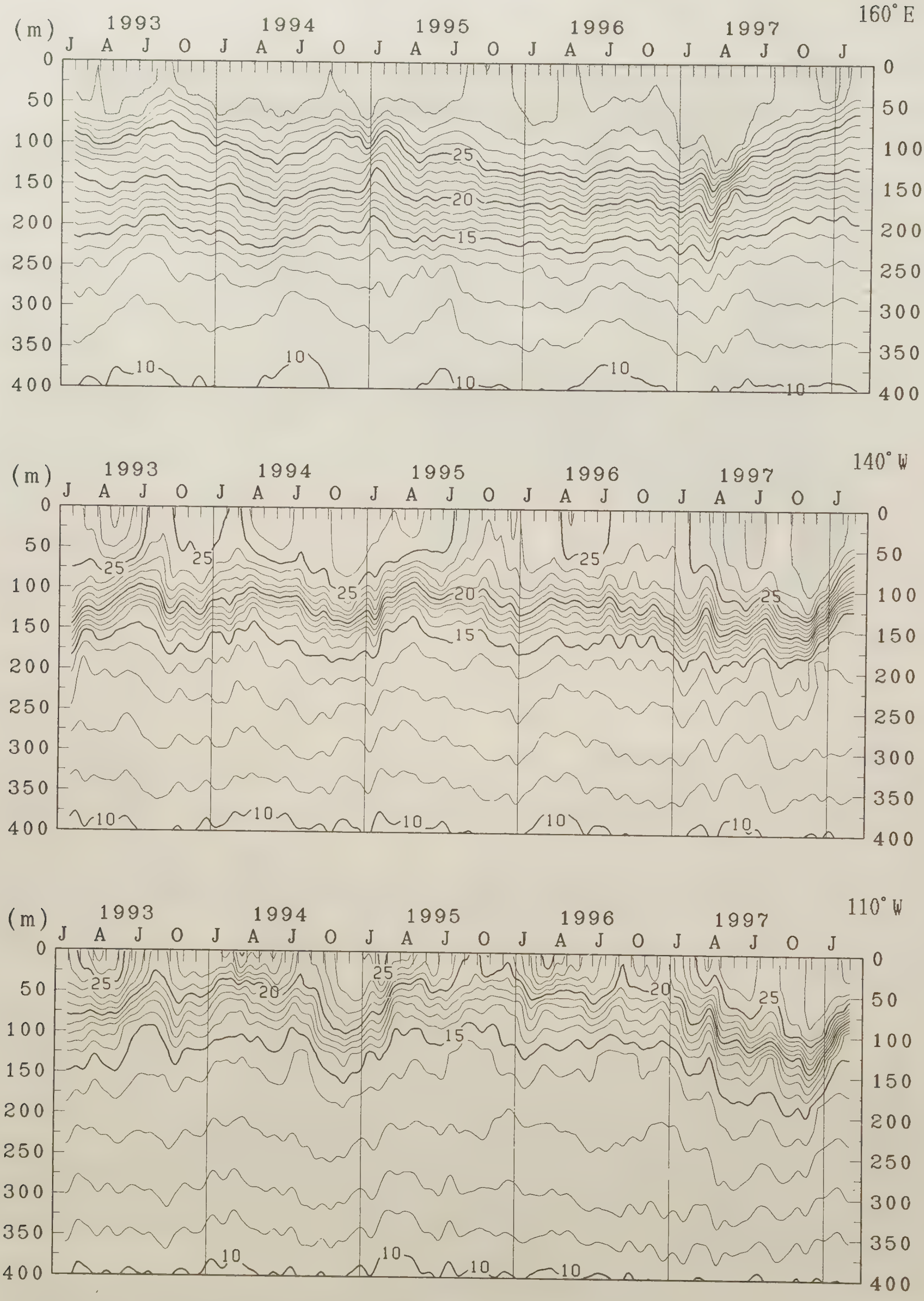
第 25 図　赤道に沿った海面水温（左）および偏差（右）の時間-経度断面図

Fig.25 Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2 °N-2 °S) in the global ocean. Contour interval is 1 °C (left) and 0.5 °C (right). Values greater than 28 °C are shaded and values less than 23 °C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.



第26図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

Fig.26 Time-longitude sections of ocean heat content in the upper 260m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1996 base period means.



第27図　太平洋赤道域の表層水温の時間－深度断面図

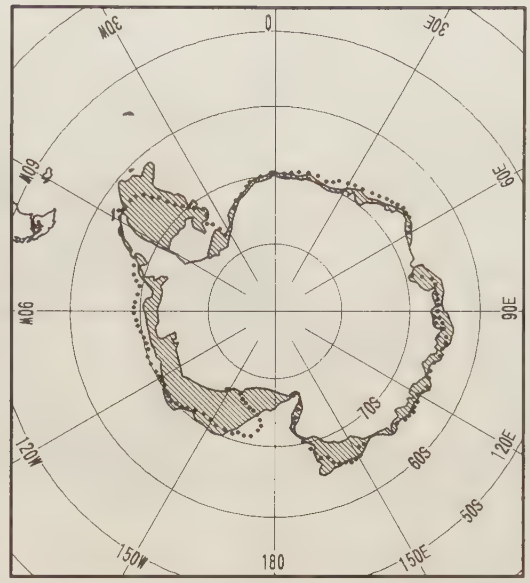
（上：西部、中：中部、下：東部）

Fig.27 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.



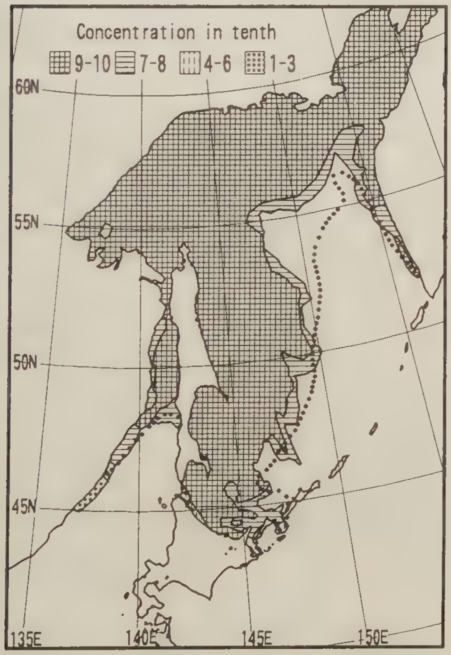
第28-1図 北極域の海氷図（1998年 2月20日）

Fig.28-1 Sea ice chart in the Arctic on 20 Feb. 1998.
The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.
The data source is the National Ice Center (USA).



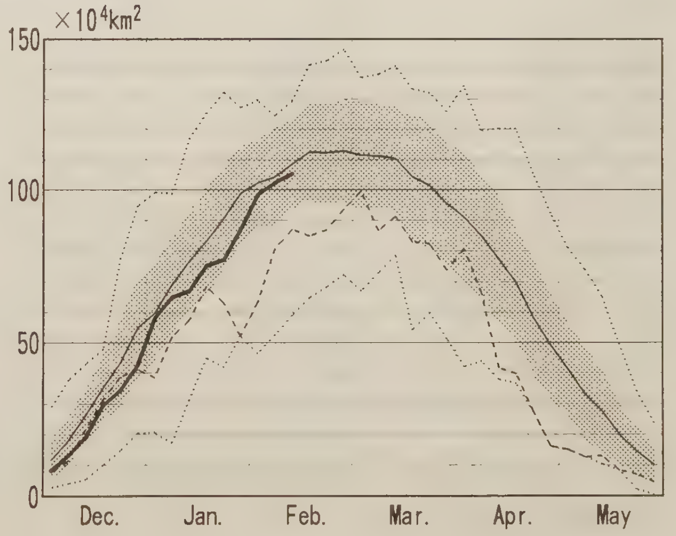
第28-2図 南極域の海氷図（1998年 2月20日）

Fig.28-2 Sea ice chart in the Antarctic on 20 Feb. 1998.
The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1973 through 1990.
The data source is the National Ice Center (USA).



第28-3図 オホーツク海の海氷図（1998年 2月15日）

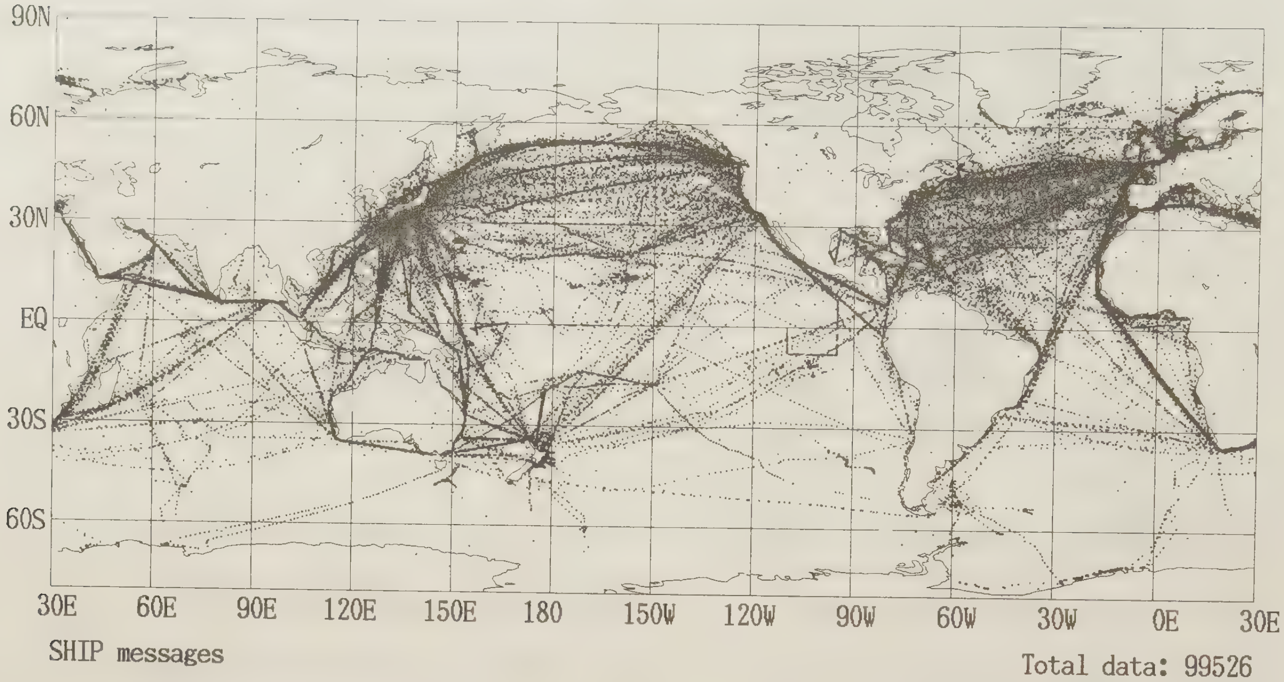
Fig.28-3 Sea ice chart in the Sea of Okhotsk on 15 Feb. 1998.
The dotted line denotes the mean ice edge averaged for the period from 1971 throuh 1990.

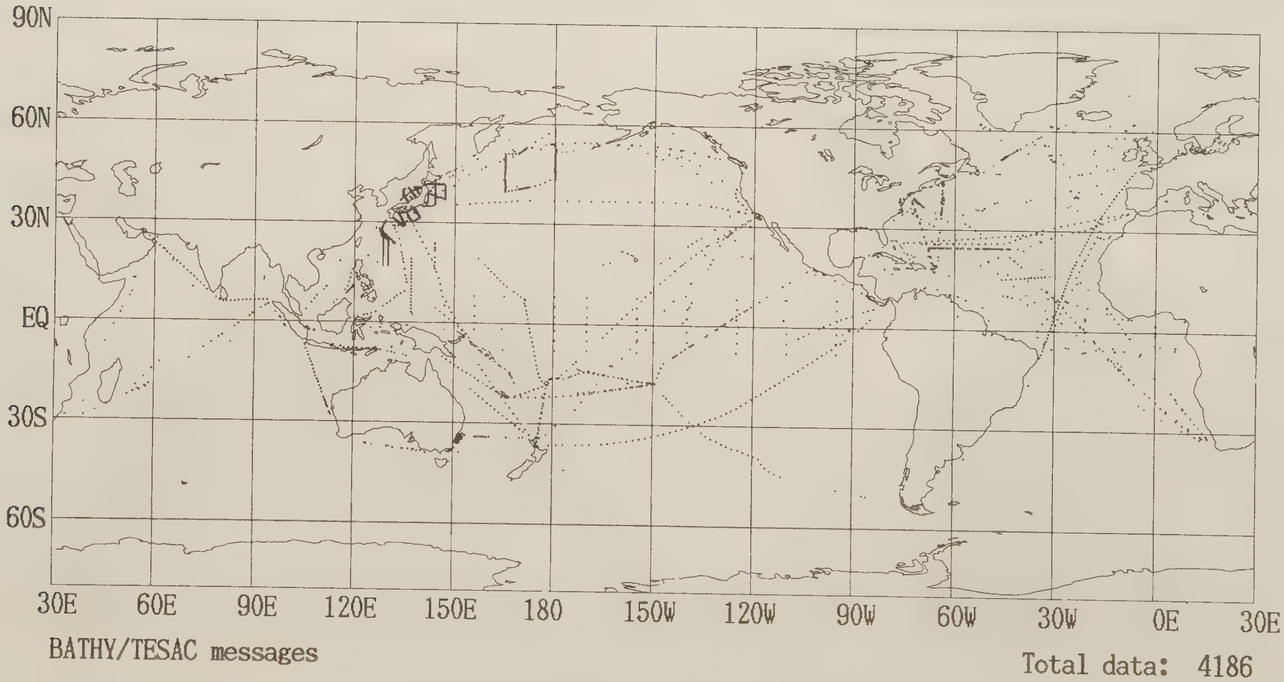


第28-4図 オホーツク海の海氷域面積

Fig.28-4 Time-series of 5-day sea ice extent in the Sea of Okhotsk.

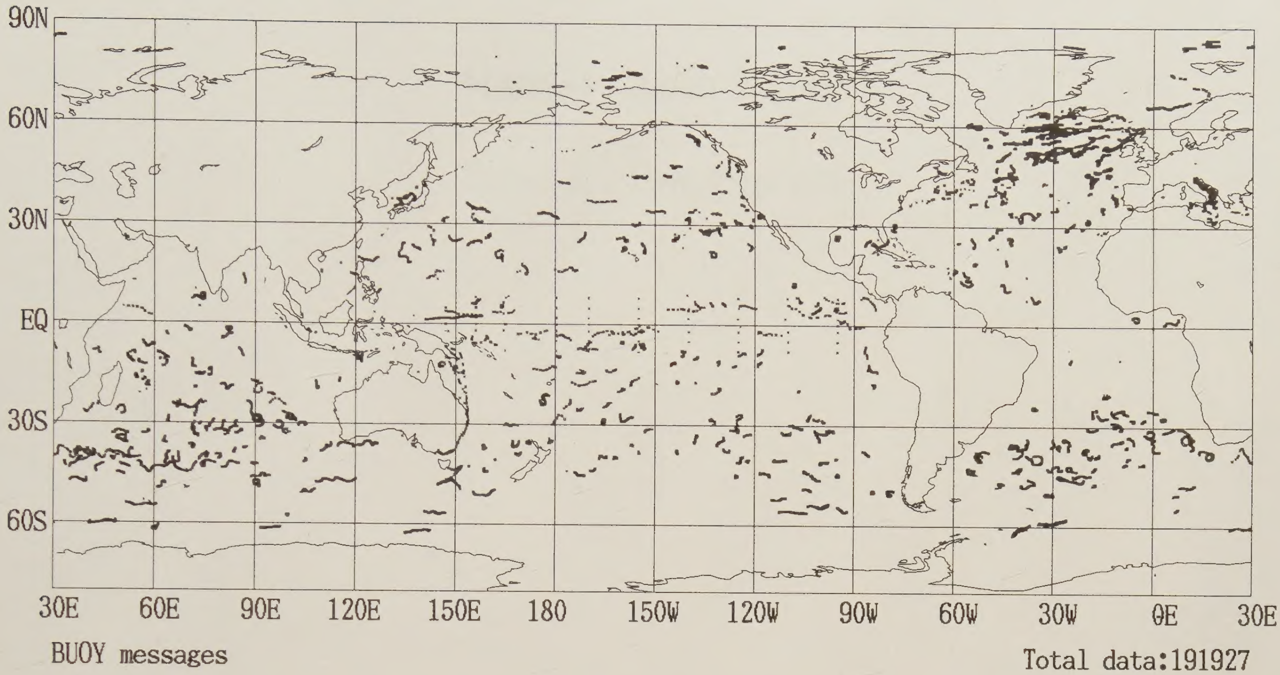
: current season(1997/98)
: mean extent(1971-1990)
: maximum or minmum extent(1971-1997)
: last season(1996/97)
: mean $\pm 1\sigma$ (1971-1990)

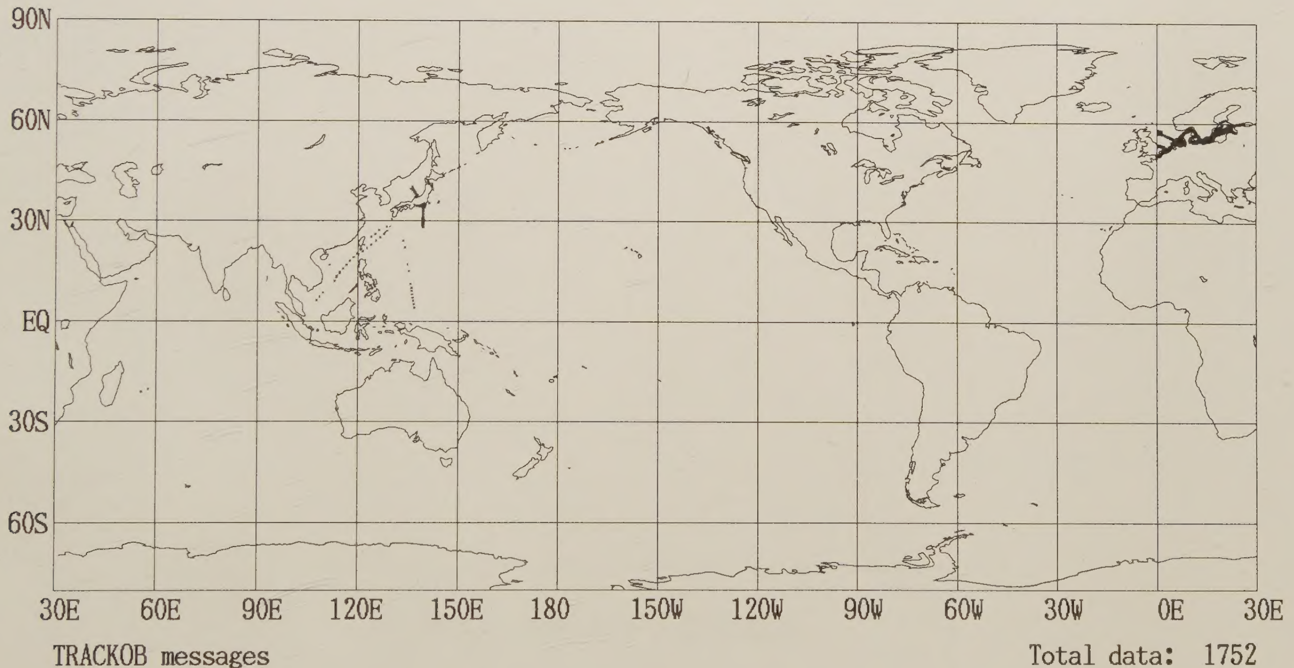




第29-1図　測点分布図(1998年 2月)

Fig.29-1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for FEB 1998.





第29-2図　測点分布図(1998年 2月)

Fig.29-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for FEB 1998.

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